

December 2013

## NIEHS Spotlight



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### [Birnbaum honored with key APHA Environmental Section award](#)

The American Public Health Association meeting featured the presentation of the Homer N. Calver award to NIEHS and NTP Director Linda Birnbaum, Ph.D.



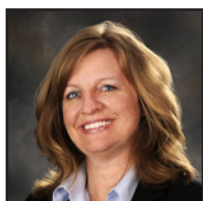
### [APHA worker safety section lauds Beard's achievements](#)

NIEHS industrial hygienist Sharon Beard brought home a prestigious award last month from the American Public Health Association annual meeting in Boston.



### [Meeting explores extended environmental exposures in breast cancer](#)

The NIEHS/NCI Breast Cancer and the Environment Research Program celebrated its tenth anniversary at its annual meeting Nov. 7-8 in Madison, Wis.



### [Anniversary meeting underscores issues in children's environmental health](#)

NIEHS- and EPA- funded researchers, scientists, and administrators celebrated the 15-year anniversary of the Children's Centers Oct. 29-30 in Washington, D.C.

## Science Notebook



### [NIEHS celebrates achievements at annual Science Day](#)

NIEHS scientists gathered Nov. 7-8 to present their research discoveries in poster and oral presentations, during the 11th annual Science Day.



### [Toxicogenetics Challenge winners announced](#)

NIEHS Deputy Director Rick Woychik, Ph.D., chaired the meeting's Challenge session Nov. 8 in Toronto and presented the speakers from the winning teams.



### [Toxicology symposium highlights the flip sides of nanomaterials](#)

The Oct. 31 symposium featured presentations on nanomaterial synthesis and properties, as well as the effects of nanomaterial use on living organisms and the ecosystem.



### [Expert panel concurs with conclusions in draft NTP technical reports](#)

The Oct. 29 meeting included presentations of study findings, public comments, peer-review comments, and panel discussions for each draft technical report.



### [Science Day training awards honor mentor and fellow of the year](#)

As part of the 11th annual celebration of NIEHS Science Day Nov. 7-8, the Institute's scientific community recognized the importance of quality training at NIEHS.

## NIEHS Spotlight



### [NIEHS issues update on GuLF STUDY progress](#)

In the first issue of a new series of newsletters, Director Dale Sandler, Ph.D., announced the completion of enrollment and the beginning of phase 2 of the study.



### [Health adaptation drives roundtable at climate change talks in Warsaw](#) Video

NIEHS organized the Nov. 15 roundtable discussion in connection with the UN Climate Change Conference (COP19) Nov. 11-22 in Warsaw, Poland.



### [Environmental justice discussion features SRP grantees](#) Audio

During a conference call Oct. 24, speakers from Superfund Research Programs explained their work engaging communities to promote environmental justice.



### [Suk honored for contribution to global environmental health](#)

The Pacific Basin Consortium for Environment and Health selected NIEHS Superfund Director William Suk, Ph.D., to receive its inaugural Chairman's Award.



### [NIEHS grantee/UCLA researcher honored by Collegium Ramazzini](#)

University of California, Los Angeles Professor Emeritus John Froines, Ph.D., received this year's Ramazzini Award for his career advancing public health.

## Science Notebook



National Institute of  
Environmental  
Health Sciences

### [Tenure awarded to two NIEHS lead researchers](#)

Honglei Chen, M.D., Ph.D., and Michael Fessler, M.D., were granted tenure Nov. 18 by the NIH Central Tenure Committee.



### [Using DNA methylation to examine epigenetic changes](#)

Cathrine Hoyo, Ph.D., explored the topic of "Testing the Developmental Origins of Adult Diseases Hypothesis" during a talk Nov. 18 at NIEHS.



### [GEMS meeting focuses on preventing and curing cancer](#)

The Genetics and Environmental Mutagenesis Society held its 31st annual fall meeting Nov. 14 at the Sheraton Imperial in Research Triangle Park, N.C.



### [Zebrafish model may lead to new therapies for mitochondrial disease](#)

A capacity audience was on hand at Duke University Nov. 15 for a talk by former NIEHS trainee Sherine Chan, Ph.D., on a new model for studying mitochondrial dysfunction.



### [Tox21 seminar highlights stem cell technology](#)

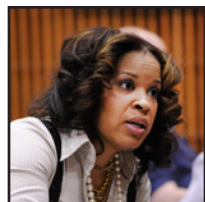
The Nov. 19 presentation was given by renowned stem cell researcher Stephen Minger, Ph.D., who is head of cellular sciences at GE Healthcare Life Sciences.

## Inside the Institute



### [Future NIH administrative leaders visit NIEHS](#)

A group of future NIH administrative, science management, and policy leaders spent Sept. 20 on the NIEHS campus in Research Triangle Park, N.C.



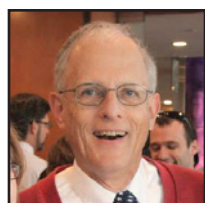
### [Federal employees meet at NIEHS to elevate their careers](#)

The first-ever Elevate Your Career event at NIEHS highlighted a new program designed to further understanding of the federal job-search and promotions processes.



### [America Recycles Day returns to NIEHS](#) Video

NIEHS celebrated its second annual America Recycles Day Nov. 14, collecting shoes, clothes, towels, blankets, eye glasses, and cell phones.



### [Sloane honored by local commuter awareness group](#)

Longtime NIEHS employee Richard “Dick” Sloane was honored on Nov. 14 with the GoTriangle Lifetime Achievement Award as part of the Golden Modes awards.



### [Proud ELF owner embraces alternative transport](#)

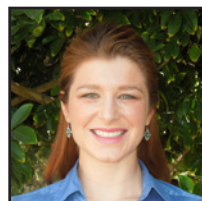
NIEHS biologist Rick Fannin turns quite a few heads as he zips through the streets in his colorful locally manufactured ELF velomobile.

## Science Notebook



### [Delaware cleanup project makes use of NIEHS-funded technology](#)

An NIEHS Superfund grant provided funds to take a new product, which uses activated carbon technology, from the lab into the field for cleaning up a polluted lake.



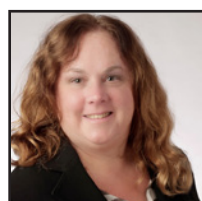
### [NIEHS trainee honored with Wetterhahn Award](#)

Corin Hammond, a doctoral student at the University of Arizona, is the 16th recipient of the annual Superfund Karen Wetterhahn Memorial Award.



### [NIEHS scientists present research at neuroscience meeting](#)

Research by NIEHS Laboratory of Neurobiology was showcased at the 43rd annual meeting of the Society for Neuroscience Nov 9-13 in San Diego, Calif.



### [UC Berkeley meeting explores methods to detect more chemicals](#)

Understanding the bigger picture of human exposure through state-of-the-art analytical chemistry was the focus of an NIEHS-funded Superfund meeting in Berkeley, Calif.



### [This month in EHP](#)

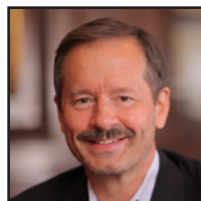
The November-December issue of Environmental Health Perspectives spotlights urban gardening and the need for better water quality for fish.



## Calendar of Upcoming Events

- **Dec. 2**, in Rodbell Auditorium, 10:30 a.m.-12:00 p.m. — NIEHS-NCATS-UNC DREAM Toxicogenetics Challenge: Crowdsourcing Tox21 Qualitative High Throughput Screening Data
- **Dec. 3**, in Executive Conference Room, 12:00-1:00 p.m. — Receptor Mechanisms Discussion Group seminar by Seth Kullman, Ph.D., on “Heart, Bone, and Cartilage: What’s AhR Got to Do With It”
- **Dec. 6**, in Rodbell A, 11:00 a.m.-12:00 p.m. — Laboratory of Reproductive and Developmental Toxicology Seminar Series, featuring Kanako Hayashi, Ph.D., discussing “The Impact of Epithelial Genes in Endometrial and Ovarian Cancer”
- **Dec. 10**, in Keystone 1003AB, 10:00 a.m.-12:00 p.m. — NTP Biomolecular Screening Branch Seminar on “Amphibian Populations in Urban and Natural Environment in Urals,” by Vladimir Vershinin, Ph.D., D.Sc.
- **Dec. 9**, in Keystone 1003AB, 11:00 a.m.-12:00 p.m. — Keystone Science Lecture Seminar Series with Sara Wylie, Ph.D., discussing “Towards a Civic Technoscience: ExtrAct and Public Laboratory for Open Technology and Science”
- **Dec. 11**, webinar, 1:00-2:30 p.m. — EPA/NIEHS Children’s Centers 2013 Webinar Series on Environment and Obesity <http://www.epa.gov/ncer/childrenscenters/webinar/2013/overview.html>
- **Dec. 12-13**, in Rodbell Auditorium, 8:30 a.m.-5:00 p.m. — NTP Report on Carcinogens Peer Review
- **Dec. 17**, in Rall F-193 — DNA Repair Videoconference with Yves Pommier, M.D., Ph.D. discussing “Application of the NCI CellMiner Cancer Genome Project to the DNA Damage Response Genes.”
- View More Events: [NIEHS Public Calendar](#)

## Science Notebook



### [Lewis Cantley to give Rodbell lecture](#) Video

The 2013 Rodbell Lecture will feature Lewis Cantley, Ph.D., the scientist that led the team that discovered the phosphoinositide 3-kinase (PI3K) pathway in 1985.

## Extramural Research

### [Extramural papers of the month](#)

- [Epigenetic effects of DDT lead to obesity in later generations](#)
- [Air pollution and psychological distress during pregnancy](#)
- [Eliminating damaged mitochondria from neuronal cells](#)
- [Maternal inhalation of nanomaterials can influence fetal health](#)

## Intramural Research

### [Intramural papers of the month](#)

- [Understanding how ribonucleotides in DNA exert their biological effects](#)
- [Stress hormone signaling found to prevent heart disease](#)
- [DNA methylation as a biomarker to detect breast cancer](#)
- [Tanning gene linked to increased risk of testicular cancer](#)



# NIEHS Spotlight

## Delegation enjoys high profile at APHA

*By Eddy Ball*

Despite new travel restrictions for federal employees, a smaller NIEHS delegation still had a significant impact at the 2013 American Public Health Association (APHA) annual [meeting](#) Nov. 2-6 in Boston. The 141st annual gathering attracted more than 13,000 public health specialists from around the world.

Along with presentations by several NIEHS grantees, senior scientists from the Institute, led by NIEHS and NTP Director Linda Birnbaum, Ph.D., underscored the continuing need for better understanding the health impact of the environment, and developing effective primary prevention measures in promotion of public health.

As Birnbaum observed afterwards, “We were fewer in number this year, but we got our messages out. People were certainly aware of the NIEHS presence at key sessions and awards ceremonies throughout the week.”

Birnbaum received the 44th annual APHA Homer N. Calver Award Nov. 4 for her outstanding contributions as an environmental scientist ([see story](#)). NIEHS Worker Education and Training Program (WETP) industrial hygienist Sharon Beard was honored Nov. 5 with the 2013 Lorin Kerr Award for her leadership of the highly regarded Minority Worker Training Program ([see story](#)).

During the busy week in Boston, NIEHS delegates and grantees participated in sessions exploring the environmental public health implications of several high-visibility events and developments.

### Partnerships for Environmental Public Health (PEPH)

Led by NIEHS program analyst Liam O’Fallon, grantees in the Institute’s PEPH program participated in five poster and oral sessions at the meeting. Topics ranged from worker safety and training, and holistic training approaches to address environmental stressors on reproductive health, to communicating risk to environmental justice communities, and the impact of neighborhood violence on physical activity in the built environment.



*Birnbaum, shown during her Calver Award talk, led the NIEHS delegation. Her award lecture addressed increasingly widespread chemical exposures. (Photo courtesy of Liam O’Fallon)*



*Beard’s Kerr Award honored her for developing safety and health training programs for low-income workers, particularly those in highly hazardous occupations. (Photo courtesy of Julia Keller)*

O'Fallon also moderated a cutting-edge session Nov. 4 on "Health and Hydrofracking: Community Outreach and Information Needs." Speakers in the session tackled emerging community information needs, in the wake of the spread of hydrofracking in the U.S.

### **One year later — Hurricane Sandy and worker safety**

Addressing a disaster that still makes the evening news one year later, NIEHS representatives Chip Hughes, WETP director, and contractor Deborah Weinstock, of the National Clearinghouse for Worker Safety and Health Training, joined WETP grantees and other public health specialists for a Nov. 4 session on "Emergency Response and Cleanup Efforts Following Hurricane Sandy."

Hughes and Weinstock focused on worker protection in Hurricane Sandy and other disasters. They discussed challenges faced by the WETP network in trying to protect recovery workers from safety and environmental hazards, and possible policy changes to improve worker and community protection in future disasters.

### **Impact of repeated disasters on public health resilience**

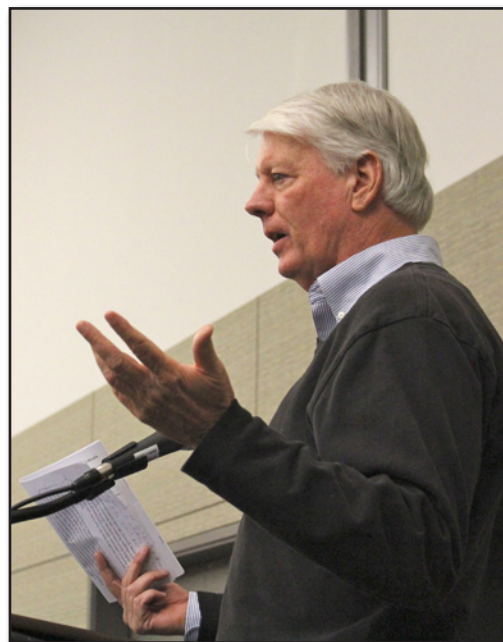
Moderated by NIEHS Director of the Office of Scientific Information Management [Allen Dearry, Ph.D.](#), the Nov. 6 session on public health resilience marshaled the talents of NIEHS Senior Advisor for Public Health [John Balbus, M.D.](#), and veteran grantees Bernard Goldstein, M.D., of the University of Pittsburgh, and Maureen Lichtveld, M.D., of Tulane University. With a focus on such disasters as Hurricane Katrina and the Deepwater Horizon oil spill, the speakers examined the impact of natural and man-made disasters on the role of public health capacity building in strengthening resilience.

Speakers described the scientific principles of resilience and their relevance to public health. Topics included factors influencing resilience in communities experiencing repeated disasters, and transdisciplinary research approaches for examining the interconnectedness of ecosystem and public health resilience.

Even for attendees who did not hear talks by Birnbaum and Beard, or participate in NIEHS-supported sessions, it would have been hard to overlook the eye-catching NIEHS-NTP-Environmental Health Perspectives display in the meeting's exposition area. Staffed by NIEHS Director of Communications Christine Flowers and volunteers, the booth communicates the groups' missions through display boards and a broad selection of literature.



*O'Fallon, left, worked front and center promoting the PEPH program, as a moderator, above, as well as behind the scenes helping coordinate the messages of grantees in other sessions. (Photo courtesy of Christine Flowers)*



*In addition to his presentation on Hurricane Sandy, Hughes also addressed worker health and safety during his nomination speech for Beard's Kerr Award. (Photo courtesy of Julia Keller)*





*Speakers in the public health resilience session included, from left, Balbus; Lichtveld; Dearry; Joy Osofsky, Ph.D., of Louisiana State University; Lisanne Brown, Ph.D., of Tulane University; and Goldstein. (Photo courtesy of Anna Hassan, Tulane University)*

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*Along with its handsome panels, the NIEHS display also featured fact sheets and other literature about environmental exposures and primary prevention. (Photo courtesy of Christine Flowers)*

## Birnbaum honored with key APHA Environmental Section award

*By Eddy Ball*

An important part of the NIEHS experience at the annual meeting of the American Public Health Association (APHA) ([see related story](#)) was the presentation of a prestigious public health award to NIEHS and NTP Director Linda Birnbaum, Ph.D.

Along with receiving the 44th annual APHA Homer N. Calver Award, Birnbaum gave the annual flagship presentation for the APHA Environment Section at an award luncheon Nov. 4, with her discussion of “When Environmental Chemicals Act Like Uncontrolled Medicine.” She was introduced by Leon Vinci, D.H.A., DEO and President of Health Promotion Consultants, who is head of the APHA Environmental Section.

“I am deeply honored by this recognition from APHA,” said Birnbaum. “But the truly important aspect of this award is the growing recognition of the central importance of chemical exposures, even at very low doses, in persistent health problems, especially those that have risen dramatically in incidence over the past few decades.”



*Vinci, left, presented Birnbaum with the award. (Photo courtesy of Liam O’Fallon)*



APHA named the award in honor of Calver, an environmental scientist and APHA leader. The award recognizes exemplary environmental health leadership, and the lecture is an opportunity for the winner to highlight late-breaking — and often controversial and paradigm-shifting — issues in environmental health science.



The Calver Award is the latest in a long list of honors and awards for Birnbaum. In October 2010, she was elected to the Institute of Medicine of the National Academies, one of the highest honors in the fields of medicine and health. She was elected to the Collegium Ramazzini, and received an honorary Doctor of Science from the University of Rochester and a Distinguished Alumna Award from the University of Illinois.

Other awards include the 2011 NIH Director's Award, Women in Toxicology Elsevier Mentoring Award, Society of Toxicology Public Communications Award, EPA's Health Science Achievement Award and Diversity Leadership Award, National Center for Women's 2012 Health Policy Hero Award, Breast Cancer Fund Heroes Award, 2013 Children's Environmental Health Network Child Health Advocate Award, and 14 Scientific and Technological Achievement Awards, which reflect the recommendations of the U.S. Environmental Protection Agency external Science Advisory Board, for specific publications.

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## APHA worker safety section lauds Beard's achievements

*By Eddy Ball*

NIEHS industrial hygienist Sharon Beard brought home a prestigious award last month from the American Public Health Association (APHA) annual meeting in Boston ([see story](#)).

Beard was honored with the APHA Lorin Kerr Award for her 19 years of leadership establishing high-impact safety and health training programs for low-income workers, particularly the NIEHS Worker Education and Training Program (WETP) Minority Worker Training Program (MWTP). Beard received the award Nov. 5 at an APHA Occupational Health and Safety (OHS) luncheon.

In its announcement of the award, OHS wrote, "Sharon has successfully navigated a complicated program development process, with multiple stakeholders and intractable training challenges, to create an innovative and highly regarded Minority Worker Training Program, [and] exhibited a tireless dedication to serving low-income workers in highly hazardous occupations."



*Beard, center, received a standing ovation at the conclusion of her acceptance speech. Her wife, Willis Page, to the right of Beard, joined her in Boston to celebrate her achievement. (Photo courtesy of Dorothy Wigmore)*

## Engagement of communities, stakeholders, and grantees

Beard was nominated for the award by WETP Director Chip Hughes, who described the leadership and accomplishments of his longtime colleague. “I think that what’s so great about her, is that she has a tireless dedication to low-income workers, environmental justice communities, and people in high-hazard situations.”



In her acceptance speech, Beard reflected on her introduction to environmental justice and worker safety, as well as the need for community engagement, in the blighted streets of Boston, while completing her masters at Tufts University in civil and environmental engineering, with a focus on environmental science and occupation health. Beard received the prestigious Environmental Science and Management Fellowship from the National Urban Fellows Inc., that brought her to Tufts University for her graduate studies.

Once she took on the challenge of creating MWTP, Beard explained, she also became keenly aware of the importance of stakeholder participation. “We came up with a framework to make sure everybody was at the table, that everybody had a chance to contribute to the process,” Beard said. “It [the program’s continued success] couldn’t have been done without the help and support of all of the grantees who have been doing it.”

As Beard told the audience, since 1995, MWTP has trained more than 10,000 workers, nearly 70 percent of whom went on to full-time employment in their respective areas. The MWTP has served as a model for quality training of its kind throughout the U.S.

Through NIEHS and working on the U.S. Department of Health and Human Services Environmental Justice Working Group, she said, “We’re pushing forward with occupational health and safety, with occupational health and disparities, and environmental justice.” Beard closed by thanking the many people who helped her to do the work that earned her the Kerr Award.



*Beaming with pride with her award, Beard, right, joined Hughes, center; and Christina Morgan of the U.S. Chemical Safety Board. (Photo courtesy of Dorothy Wigmore)*

## Kudos from colleagues

Several attendees had praise for Beard’s two decades of engagement in worker safety training.

- University of California, Los Angeles Professor Linda Delp, Ph.D., chair of the APHA OHS Section — “Sharon Beard is paving the way to integrate worker health and environmental justice. Her dedication to the NIEHS Minority Worker Training Program has laid the foundation for groundbreaking initiatives across the country and the APHA OHS Section is proud to honor her leadership.”
- Lois Adams, branch chief, of Grants, Tribes, Communities and Municipal Assistance at the U.S. Environmental Protection Agency — “Sharon sets the bar for quality and service, so it is rewarding to see the sustained superior efforts of a truly deserving and dedicated environmental professional be recognized.”
- Eastern Kentucky University Professor Sheila Pressley, Ph.D. — “Sharon Beard has dedicated her entire career to the health and protection of workers, and she is highly regarded and respected by all who know her. She is a consummate professional and there is no one more deserving of the Lorin Kerr Award.”

(See Nov. 13 [Pump Handle blog](#) by freelance writer Elizabeth Grossman for commentary about Beard and the other OHS awards winners honored at this year's APHA meeting.)

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## Meeting explores extended environmental exposures in breast cancer

By Eddy Ball

As a fitting way to celebrate its 10th anniversary, the [Breast Cancer and the Environment Research Program \(BCERP\) annual meeting](#) Nov. 7-8 in Madison, Wis. featured a keynote address by NIEHS Director Emeritus Ken Olden, Ph.D., and a concluding session talk by NIEHS and NTP Director Linda Birnbaum, Ph.D.

Olden focused on the original vision for BCERP, which he had a major part in creating in 2003 in response to community and scientific engagement. Birnbaum looked ahead, building on program accomplishments to advance toward a 21st century agenda she will have an important role in setting, while continuing to engage the community and promote the active involvement of the advocacy community in the program.

Both presentations framed an exciting series of talks, by an impressive lineup of experts, about advances in understanding the role of extended environmental exposures in breast cancer and how to launch effective primary prevention measures.

BCERP is supported by the Avon Foundation and NIH, with [NIEHS](#) and the National Cancer Institute overseeing research grants. The meeting attracted some 225 attendees in the university town of Madison.

### Empowering women

As meeting co-organizer Les Reinlib, Ph.D., the NIEHS health scientist administrator who oversees more than 30 breast cancer research grants, said, "We're all about prevention — empowering women to take control of their own risk for breast cancer."

Reinlib's presentation, "BCERC: A First Step Towards Preventing Breast Cancer," opened the first session and focused on the program's initial phase accomplishments, one of the most important of which was a much clearer understanding of risk. Although some established risk factors, such as age and family history, cannot be altered, Reinlib explained, lifestyle choices, such as diet, microwaving food in plastic containers, and alcohol consumption, can be modified.

With better understanding and effective communication, an important part of BCERP, women can also learn how to prevent many environmental exposures, such as radiation, pesticides, and certain hormones and hormone-like substances. "Most of breast cancer risk, particularly in younger women, does not come from family history," Reinlib said, "[so] we've still got 80 percent that has got to be environmental."



*Birnbaum identified three important goals for the next phase of BCERP — identifying early biomarkers for breast cancer; better understanding the role of social and cultural factors; and developing preventive health messages and effective routes of communication to medical providers, policymakers, and the public. (Photo courtesy of Steve McCaw)*



The primary focus of BCERP research is on puberty, which Reinlib called one of the best early predictors of breast cancer in women. He said that learning from human and animal studies about how breasts develop, and what exposures influence cancer onset, might lead to an immediate reduction in risk for breast cancer in the future. “In girls we can study risk factors,” Reinlib said. “In animals, we can study disease outcomes of those risk factors.”

Other [speakers](#) on day one of the meeting covered a range of mechanistic and epidemiological research. Among the groundbreaking BCERP research that is taking a divergent approach to risk, according to Reinlib, is work on the role of the adaptive immune system and inflammation in breast cancer development.

The first session of day two featured discussions of the Interagency Breast Cancer and Environmental Research Coordinating Committee (IBCERCC) report ([see text box](#)).

### Building on a decade of research

In the final session of the meeting, Birnbaum made her presentation, “The Future of Breast Cancer Research and Prevention: A 21st Century Agenda.” One of her first slides dealt with windows of susceptibility, showing results of a longitudinal study of Japanese women and girls exposed to atomic radiation in Hiroshima and Nagasaki. Risk ratios ranged from a minimal 1.3 for women exposed after age 20 to a dramatic 3.9 for girls exposed prior to age 4.

These and other new insights into breast cancer development are informing a range of NIEHS-supported and NTP-supported basic, translational, and epidemiological studies, representing some \$31 million of support in fiscal year 2012 alone. New directions include the development of innovative models, such as the zebrafish and outbred mice, for higher-throughput testing and greater genetic diversity.

“Further research is needed into individual susceptibility across the lifespan,” Birnbaum told the audience, as she pointed to challenges and opportunities ahead.

## IBCERCC and prioritizing prevention

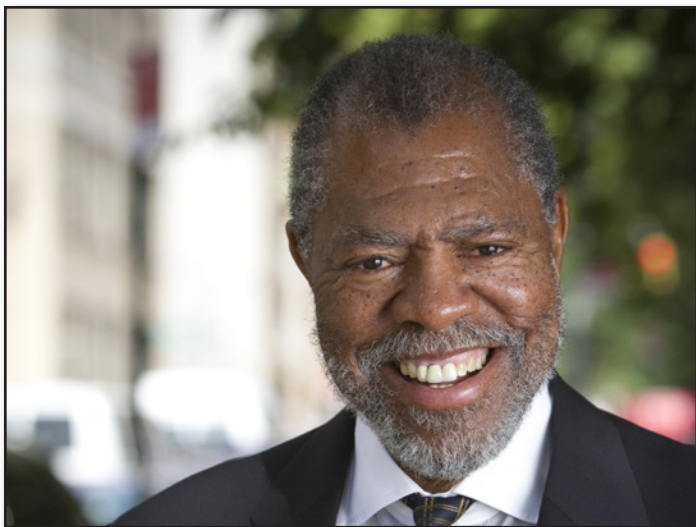
The discussion of the IBCERCC and its implications for BCERP was presented by Gwen Collman, Ph.D., NIEHS Division of Extramural Research and Training director, and Deborah Winn, Ph.D., deputy director of the National Cancer Institute Division of Cancer Control and Population Sciences. Collman is the executive secretary of the committee, and Winn serves as co-executive secretary. The committee held the first of a series of meetings in October 2008.

Based on its review of the state of the science, current programs and investments by federal agencies and nongovernmental organizations, and relevant communication efforts and policies, in February 2013, the IBCERCC issued a comprehensive report to the Secretary of the U.S. Department of Health and Human Services, summarizing its findings and seven recommendations to highlight the need for coordinated, targeted efforts to identify and mitigate the environmental causes of breast cancer.

The report is now available as a four-page [Summary of Recommendations](#), and a 270-page [Full Report](#).



*According to Reinlib, the BCERP message is getting out to the public. “If you Google breast cancer and the environment, BCERP always comes up in the top two or three,” he said. (Photo courtesy of Steve McCaw)*



*Olden served as NIEHS director from 1991-2005, leading such innovative initiatives as BCERP and environmental justice. (Photo courtesy of City University of New York)*



*As executive secretary of IBCERCC, Collman moderated discussions by a broad range of federal and nonfederal scientists and advocates, helping to achieve consensus on a new federal agenda for breast cancer research. (Photo courtesy of Steve McCaw)*

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## Anniversary meeting underscores issues in children's environmental health

*By Joe Balintfy*

Collaboration, communication, and recognition of the broad scope of research in children's health were just a few of the themes featured during the [Children's Environmental Health and Disease Prevention Research Centers](#) (Children's Centers) annual meeting Oct. 29-30 in Washington, D.C.

As researchers, scientists, and administrators celebrated the [15-year anniversary](#) of the Children's Centers, which are jointly funded by NIEHS and the U.S. Environmental Protection Agency (EPA), speakers highlighted the importance of the collaborative effort and looked forward to advancing research in emerging areas of interest, including obesity, endocrine-disrupting chemicals, and epigenetics.

"Whether you're physicians, nurses, other healthcare providers, scientists, NGOs [non-governmental organizations], parents, or family members, all of you are really driving EPA and the federal government to do better and better, as we try to identify the real challenges our children are facing," said EPA Administrator, Gina McCarthy. "And, when it comes down to it, that's what we're all working for. We're working for the future."



*In her opening remarks, McCarthy underscored the idealism in the Children's Centers mission, to use research on the environmental triggers of disease to support preventive efforts for promoting children's optimal health. (Photo courtesy of EPA)*



## Collaborating and pooling resources

NIEHS and NTP Director Linda Birnbaum, Ph.D., added, “Environmental health is really too broad a field to have it all in one narrow area. People have to talk to each other and bring different approaches and tools together.”

Communicating and collaborating are exactly what many participants devote their time to accomplishing. For example, Margaret Karagas, Ph.D., director of the new Children’s Center at Dartmouth College, and Kari Nadeau, M.D., Ph.D., an investigator in the Dartmouth Children’s Center, as well as the University of California (UC), Berkeley/Stanford Children’s Center, commented that they meet with program officers and people from NIEHS and EPA, and collaborate with other Children’s Centers, so they can learn, generate new ideas, and think creatively about what can be done together to make programs even stronger.

“Meeting Dr. Nadeau at the last meeting led to an exciting new collaboration, investigating the effects of *in utero* arsenic exposure on newborn immunity, using the sophisticated Stanford laboratory,” said Karagas. “In our new Children’s Center, we will investigate the impacts of environmental contaminants, such as arsenic on children’s vaccine response.”

## Broad scope of centers and study

“It’s enormous,” said Gregory Diette, M.D., of Johns Hopkins University, who gave a review of air cleaners and asthma research. “It’s mind boggling how much stuff has been done and done so well.”

More than a dozen sessions and presentations included remarks from more than 40 experts. Topics included food safety, air pollution, chemicals in consumer products, brain function, and a variety of disease areas.

The Children’s Centers program lead at NIEHS, Kimberly Gray, Ph.D., said that several themes crossed over the various sessions, including a need to assess combined factors.

## Children’s health congressional briefing

At the end of the Children’s Centers annual meeting, Birnbaum, along with a handful of presenters and attendees, went to the Hill for a congressional briefing hosted by Sen. Kirsten Gillibrand, D-N.Y.

James Johnson, Ph.D., director of the National Center for Environmental Research in the Office of Research and Development at EPA, described it as an opportunity to explain to policymakers how the Children’s Centers are doing research to understand the relationship between environmental exposure and children’s health.

He noted the significance of communicating with lawmakers. “They have a great impact upon what action items we can really turn into policy, so they’re not only options anymore, they become mandates for protecting our children’s health,” he said.

Johnson added that it’s necessary for information from the Children’s Centers to also be shared with health care providers, parents, and the community, so that they can take action to reduce risks to children, as well.

There are now 16 Children’s Centers across the country generating practical information about improving children’s environmental health.



*Birnbaum pointed to the need for team science and transdisciplinary approaches, to translate research findings into prevention of disease. (Photo courtesy of EPA)*



“The cumulative effects of living in a poor environment, how that accelerates risk, and the impact of chronic exposures to toxic substances are powerful determinants of health.”

### Communication also seen as key

Gray also stressed the importance of coordinated messaging, using the example of arsenic in apple juice presented in the opening session, “Hot Topics in Food Safety and Children’s Health.”

“A coordinated approach with Consumer Reports, FDA [U.S. Food and Drug Administration], and research scientists would have been more informative and helpful to the public than the mixed messages projected by the media,” she said.

The day one closing keynote by Randy Olson, Ph.D., also emphasized communication, with advice on how to keep scientific messages simple, clear, and succinct so they will have broader reach. He shared an app, known as Connection Storymarker, to help users focus, structure, and strengthen their messages.

Yet even with research partnerships, progress, and an app, Birnbaum reminded attendees, environmental health research cannot be fully effective unless the community is involved.

“We’re not telling the communities what to do. We’re getting in there, and the communities are telling us what their concerns are, how to deal with them, how do we work together, everyone, to make better lives for our children and ourselves,” she said.

(Joe Balintfy is a public affairs specialist in the NIEHS Office of Communications and Public Liaison.)

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## NIEHS issues update on GuLF STUDY progress

*By Eddy Ball*

In the first issue of a new series of newsletters, NIH [GuLF STUDY \(Gulf Long-term Follow-up Study\)](#) Director and NIEHS Epidemiology Branch Chief Dale Sandler, Ph.D., announced the completion of enrollment and the beginning of phase 2.

According to Sandler, almost 33,000 people have joined the study of the short-term health effects of human exposure to oil and dispersants during the 2010 Deepwater Horizon oil spill and its clean up. With phase 1 interviews and home visits completed, researchers are now recruiting enrollees for participation in phase 2, which will focus on the long-term health effects of oil and dispersant exposure.

“We have the information we need to begin evaluating any short-term health effects of the spill,” Sandler wrote in the [first issue](#) of the newsletter.



*Gray is the NIEHS program lead for the NIEHS/EPA Children’s Centers. She is also involved in the [National Children’s Study](#), through a partnership with the Eunice Kennedy Shriver National Institute for Child Health and Human Development, the lead institute for the study. (Photo courtesy of Steve McCaw)*

Among the early findings released in the newsletter are the demographic profiles of the participants — information about gender, age, race, occupation, exposure setting, and state of residence.

## Entering phase 2

NIEHS is leading the GuLF STUDY, with the support of many local community groups that will do their part to spread the word. For phase 2, the study team is asking enrollees to help researchers answer important question about long-term health effects by:

- Responding to requests to confirm or update contact information.
- Completing a brief follow-up telephone interview about individual health and lifestyle.
- Taking part in a more detailed clinical exam at a local medical center.

## Progress reports and continuing outreach efforts

With enrollment complete, the Gulf STUDY team is beginning the difficult task of analyzing and interpreting the large amount of data on the 33,000 participants. In addition to phone interviews with all enrollees, researchers made home visits to 11,200 participants to complete a brief medical exam and collect blood samples.

Regular updates during the remainder of 2013 and into 2014 will report the results of the interviews, medical exams, and blood samples, as they become available.

The GuLF STUDY will continue community outreach information sessions, with the next scheduled to take place in early 2014 in Mobile, Ala. NIEHS scientists have also participated in media tours, to boost recruitment and inform residents of affected states about the progress of the study.

Several celebrities have volunteered their time to raise awareness of the study, including Phil Robertson, patriarch of television's "Duck Dynasty." The first issue of the GuLF STUDY newsletter includes a message from Robertson encouraging participants to stay involved.

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## Contacting the GuLF STUDY team is easy

- Hotline — 1-855-NIH-GULF (1-855-644-4853)
- Hours: Monday-Saturday, 9 a.m. to 8:00 p.m. (CST); Sunday, Noon to 5 p.m. (CST)
- Website — [www.gulfstudy.nih.gov](http://www.gulfstudy.nih.gov)
- Email — [info@gulfstudy.nih.gov](mailto:info@gulfstudy.nih.gov)
- Social media — Find us on Facebook and Twitter



*In addition to her work with the GuLF STUDY, Sandler oversees several other large-scale NIEHS epidemiological studies of environmental health, including the Agricultural Health Study and the Sister Study. (Photo courtesy of Steve McCaw)*

# Health adaptation drives roundtable at climate change talks in Warsaw

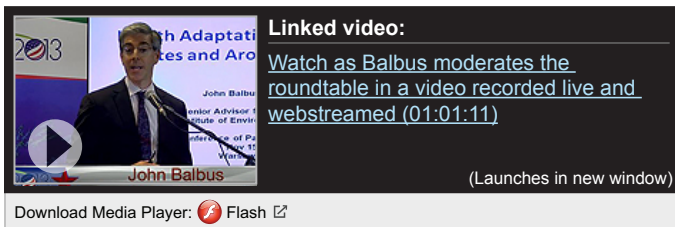
By Paula Whitacre

Climate change has profound implications on human health, and the health sector in the United States and elsewhere is stepping up efforts to adapt to that change. These issues were discussed at a Nov. 15 session organized by NIEHS, in connection with the [UN Climate Change Conference](#) nineteenth session of the Conference of the Parties (COP 19) Nov. 11-22 in Warsaw, Poland.

NIEHS Senior Advisor for Public Health John Balbus, M.D., moderated the session, which took place at the U.S. Center at COP 19 set up by the U.S. Department of State. He was joined by Magaran Bagayoko, Ph.D., of the World Health Organization (WHO), Africa; Carlos Corvalan, Ph.D., Pan American Health Organization (PAHO)/WHO; Diarmid Campbell-Lendrum, D.Phil., WHO, Geneva; and Jan Semenza, Ph.D., European Centre for Disease Prevention and Control.



*Balbus is the NIEHS lead on climate change and international collaborations. He has worked to raise awareness about the health impacts of climate change, through a number of discussions with representatives of partner organizations worldwide. (Photo courtesy of Steve McCaw)*



The speakers noted that climate change debates have not always given human health the urgency it needs, given the direct and indirect impacts ([see text box](#)), and the health sector hasn't been as involved as it should until recently. However, the roundtable participants observed that policy makers are recognizing this urgency and involving the health sector to a greater degree than ever before.

## Cross-sector collaboration

"A strategic alliance between health and environment is the way forward," said Bagayoko. In Africa, ministers of health and of the environment met in 2008 and 2010 to develop strategies to collaborate across and within countries. Bagayoko said WHO has since worked with many countries to develop situational analyses and needs assessments, and to integrate health considerations into National Adaptation Plans of Action.

Corvalan similarly acknowledged a raised profile in Latin America to address the implications of climate change for health and health systems. He described a four-part strategy to gather and share evidence, raise awareness, build partnerships, and adapt and strengthen health systems.

Balbus described some cross-sector initiatives in the U.S., including the President's Climate Action Plan, which promotes health sector and community health resilience to climate change, and the U.S. Global Change Research Program Interagency Crosscutting Group on Climate Change and Human Health, observing, "It was set up specifically to make the bridge between basic research and real-world interventions."





## Calls to action

Campbell-Lendrum identified two milestones that became calls to action for the global health community — a 2007 speech by WHO Director-General Margaret Chan, M.D., on human vulnerability to climate change, and the 2008 WHO World Health Assembly resolution on climate change and health.

WHO works with other UN agencies and other countries on adaptation planning and approaches. As one example, Campbell-Lendrum noted the increased presence of representatives from health ministries at the Warsaw meeting, something that did not happen as regularly at past UN climate change conferences.

## Examples of health adaptation

The speakers highlighted short-term examples of adaptation, including building or renovating health care facilities so they can function during extreme weather events, developing new ways to provide clean water to reduce vector-borne illness, and building homes to protect people from rising water levels in the Amazon.

Dealing with long-term impacts is a challenge, the speakers agreed, given the severe health problems of the present. A way around that challenge is to develop adaptation strategies that also address current health crises, such as ones related to the climate, and weather influences on current epidemics of malaria and asthma.

Semenza described one such initiative — his agency's European Environment and Epidemiology Network Web portal. "It's 21st century surveillance to collect environmental data and assess environmental precursors of epidemics," he explained, noting its demonstrated utility as an early warning system in connection with outbreaks of malaria in Greece, West Nile virus in southeastern Europe, and encephalitis in Sweden.

In response to a question from the audience, the speakers agreed that the health sector also has a responsibility to implement proactive strategies to ease climate change, such as reducing its own fossil fuel combustion and resource use.

Through its new WHO Collaborating Center, NIEHS will continue to partner with international health organizations to improve the environmental health science aspects of climate change.

(Paula Whitacre is a contract writer with the NIEHS office in Bethesda, Md.)

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## Health impacts of climate change

Balbus framed the discussion about health adaptation to climate change by identifying four main categories of impacts:

- Direct impacts of climate change, weather, and sea level rise on humans, leading to heat-induced illness, heat stress that exacerbates chronic illnesses, and effects from storms and other weather extremes.
- Impacts on physical and chemical agents, such as air pollution effects, environmental movement of toxic chemicals, and ozone depletion interactions.
- Impacts on biological agents, including microbes, plants, insect vectors, and other animals that are affected by the weather and climate and lead to transmission of infectious or allergic diseases.
- Impacts on fundamental life supports, with water availability, food/crop productivity, and shelter affected by changing climate and rising sea levels.

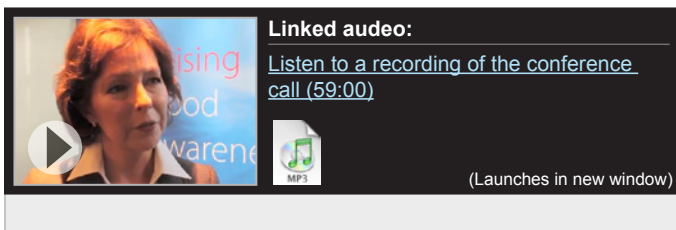
Each type of impact requires different adaptation efforts, involvement of different sectors, and different types of scientific knowledge, Balbus pointed out.

# Environmental justice discussion features SRP grantees

By Sara Mishamandani

The NIEHS Superfund Research Program (SRP), through its Community Engagement Cores (CEC), has a strong history of working with communities to support environmental justice goals.

During a conference call Oct. 24, organized by the Boston University SRP and its Research Translation Core partner, the [Collaborative on Health and the Environment \(CHE\)](#), speakers from SRP centers at Brown University (BU), the University of Arizona (UA), and Louisiana State University (LSU) explained their innovative work engaging communities to promote environmental justice.



Environmental justice is the fair treatment of people of all races, cultures, and incomes, through the development and enforcement of environmental laws, regulations, and policies. "The Community Engagement Cores are dedicated to working with communities to support environmental justice goals," CHE Director [Elise Miller](#) said in her opening remarks.

## Participants describe programs geared to different needs

[Phil Brown, Ph.D.](#), addressed BU SRP activities across Rhode Island, which include working closely on environmental health and justice education and outreach with community-based partner organizations, especially the Environmental Justice League of Rhode Island; expanding after school health education for students; and developing science cafés to inform citizens of environmental health research and local issues. He also described BU SRP work with multiple levels of government aimed at developing comprehensive environmental legislation on remediation and reuse.

[Denise Moreno Ramírez](#) discussed how UA SRP is working in the U.S.-Mexico border region, which is plagued by a growing environmental health crisis resulting from inadequate environmental infrastructure, uncontrolled disposal of hazardous waste, and widespread exposures to heavy metals from mining and metal processing. She talked about UA SRP work to empower underrepresented community members of the border region to become active participants in recognizing and resolving hazardous environmental contamination risks. She described one of their activities in collaboration



*Brown is the BU SRP CEC leader and a distinguished professor at Northeastern University. (Photo courtesy of Phil Brown)*



*Moreno Ramírez is the UA SRP CEC coordinator. (Photo courtesy of Denise Moreno Ramírez)*

with promotoras, Latina community health workers, which consists of a series of training modules to help them translate environmental health science in their communities.

[Margaret Reams, Ph.D.](#), discussed LSU SRP work with residents and local environmental leaders facing potential exposure to contaminants from Superfund sites. LSU SRP collaborates with the Louisiana Environmental Action Network, a public interest organization with more than 100 affiliated groups, to reach leaders and members of grassroots environmental organizations. LSU SRP emphasizes the need to foster more resilient communities, and to enhance the capacity of communities facing cumulative environmental exposures to take steps to make them safer.

Comments at the end of the call were made by Staci Rubin, a staff attorney with Alternatives for Community and Environment; an environmental justice organization in Massachusetts; and a community engagement core partner of the BU SRP. A recording of the call and background information is available on the [CHE website](#).

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)

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*Reams directs the LSU SRP CEC and is an associate professor of environmental sciences at LSU. (Photo courtesy of Margaret Reams)*

## Suk honored for contribution to global environmental health

*By Sara Mishamandani*

The Pacific Basin Consortium for Environment and Health (PBC) selected NIEHS Superfund Research Program (SRP) Director William Suk, Ph.D., to receive its inaugural Chairman's Award. The award, presented at the 15th International Conference of the PBC Sept. 24-27 in Honolulu, recognized Suk's enormous contribution to reshaping the PBC to focus more on global environmental health, with particular emphasis on children's health.

The PBD, originally called the Pacific Basin Consortium on Hazardous Wastes, was established in 1986 to address the issues of toxic waste in the Pacific Basin region resulting from rapid industrial growth. The consortium provides a forum for scientists and engineers to facilitate dialogue and cooperation among industry, governments, and academia, to tackle problems associated with hazardous waste production, management, and remediation.



*Suk presented the keynote speech at the 2013 PBC Conference. (Photo courtesy of East-West Center)*



As part of the opening ceremony at the meeting, Suk presented a keynote speech, looking back on a quarter century of the PBC, and providing ideas for moving forward. He also discussed his involvement in a new collaborative project led by the World Health Organization (WHO), to explore the health effects of electronic waste, or e-waste ([see story](#)).

“The WHO program on e-waste, which was officially launched at the PBC conference, is a current-day example of the hazardous waste problems that were the original brief of the PBC,” said PBC Chair Peter Sly, M.D., D.Sc. “I think it shows Bill’s dedication to such issues that he has been intimately involved in, with this new project. This should give us all hope for the future.”



*Sly, left, presented Suk with the inaugural PBC Chairman's Award at the international conference. (Photo courtesy of East-West Center)*

### **Addressing emerging global environmental health issues**

Suk played a special role in the development of the PBC, helping to transform the organization’s mission over time from focusing primarily on remediation to include greater consideration of health effects. He served as a member of the board of directors from 1996-2004, and chair from 2000-2004.

In 1996, Suk was instrumental in organizing the PBC meeting in Kuala Lumpur, Malaysia, which began the shift within the PBC to become more health-driven. Over the years, the PBC has further evolved in its consideration of environmental health issues.

The PBC, as it is today, reflects Suk’s vision for the organization, which, along with the SRP, addresses toxic substances in an interdisciplinary fashion, ranging from methods of remediation to studies of health effects.

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)

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## **NIEHS grantee/UCLA researcher honored by Collegium Ramazzini**

*By Eddy Ball*

University of California, Los Angeles (UCLA) Professor Emeritus [John Froines, Ph.D.](#), received this year’s Ramazzini Award for his career advancing public health. Collegium Ramazzini President Philip Landrigan, M.D., presented the award and medal during a ceremony Oct. 26 in Carpi, Italy, as part of the annual [Ramazzini Days](#).

Froines continues to serve as associate director of the NIEHS-funded [Southern California Environmental Health Sciences Center](#), which is headquartered at the University of Southern California and directed by Frank Gilliland, M.D., Ph.D. He previously served as director of the Center for Occupational and Environmental Health at UCLA, the Southern California Particle Center, director of the UCLA-Fogarty Training Program in Occupational and Environmental Health, and, for nearly 30 years, on the California Scientific Review Panel on Toxic Air Contaminants before resigning in 2013 (see Sacramento Bee [story](#) on Froine’s accomplishments during his time on the panel).

In its announcement of the award, the Collegium Ramazzini pointed to Froines' leadership in establishing exposure standards. "His outstanding career in occupational and environmental health research and advocacy [included] pioneering work to develop the federal occupational lead and cotton dust exposure standards in the United States and work in California that led to the recognition of diesel exhaust as a significant toxic air contaminant, preserving the health and the lives of millions."

The award is presented annually to exceptional scientists from around the world. In 1989, then NIEHS Director David Rall, M.D., Ph.D., was honored for bringing advances in the knowledge of the relationship between the environment and human health, sharing the award with Japanese epidemiologist Takeshi Hirayama, M.D., a pioneer in establishing the link between secondhand smoke and lung cancer.



*Froines, center holding his award statue, was joined by Landrigan, left, and longtime USC colleague Andrea Hricko during the ceremony at the Hotel Touring Carpi. (Photo courtesy of Omar Gavioli)*

## Public health and civil rights

According to a Pump Handle [post](#) by fellow public health scientist Celeste Monforton, Dr.PH, of George Washington University, a nomination letter lauded his tireless advocacy of public health and worker safety; his ground-breaking research in air pollution and hazardous chemicals; and his high-profile role in the 1960s anti-war and civil rights movements.

Among his many national public policy contributions was his service as deputy director of the National Institute for Occupational Safety and Health during the presidency of Jimmy Carter and his collaboration with Occupational Safety and Health Administration chief Eula Bingham, Ph.D., herself a Ramazzini Award recipient in 2000.

"Research that threatens powerful economic interests—in Froines' case, the trucking industry, lead producers, and pesticide manufacturers, to name a few—typically leads to attacks by those interests of the scientists," Monforton wrote. "Dr. Froines experienced that firsthand over the decades of his career and still today."

Froines' most recent publication is "[Risk and Decision: Evaluating Pesticide Approval in California](#)," a review of the registration process for methyl iodide. The 2013 report was published by the Sustainable Technology and Policy Program at UCLA, of which Froines is a co-director.



*The statue honors Italian physician and University of Modena Professor Bernardino Ramazzini (1633-1714), who authored one of the seminal works of occupational medicine, *De Morbis Artificum Diatriba* (Diseases of Workers). (Photo courtesy of Omar Gavioli)*

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# Science Notebook

## NIEHS celebrates achievements at annual Science Day

*By Heather Franco*

NIEHS celebrated the research programs conducted in its intramural and extramural divisions during the 11th annual NIEHS Science Day Nov. 7-8, as scientists gathered to present their research discoveries in poster and oral presentations. The event culminated with the presentation of awards for outstanding poster and oral presentations, and the prestigious Mentor of the Year and Fellow of the Year awards ([see related story](#)).

According to organizer Joel Abramowitz, Ph.D., special assistant to the scientific director, the event was a great success. “Everyone was overwhelmed by the science conducted by the trainees at NIEHS,” he told the audience. “Congratulations to everyone!”

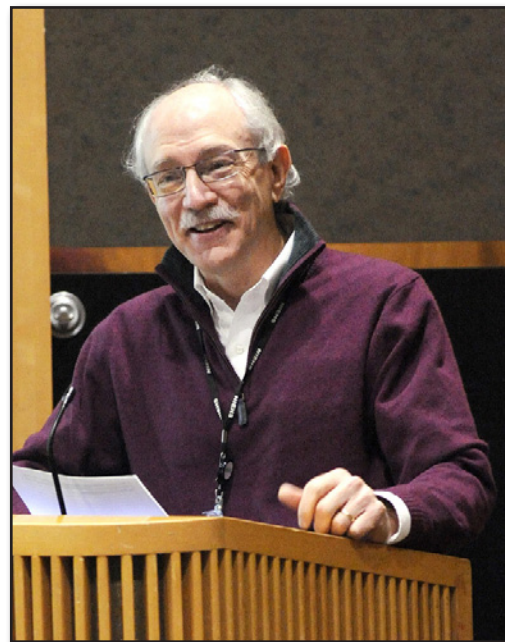
### Oral presentations highlight diverse areas of research

Science Day opened with a talk by National Toxicology Program (NTP) molecular toxicologist [Scott Auerbach, Ph.D.](#), of the Biomolecular Screening Branch. He discussed how bioinformatics can be used to assess the changes that various chemicals have on an organ system and how identifying these changes can help in the identification of the mechanisms involved in the development of disorders, such as cancer.

[Jack Taylor, M.D., Ph.D.](#), head of the Molecular and Genetic Epidemiology Group within the Division of Intramural Research (DIR), presented his work on the role of methylation in the development of breast cancer using the [NIEHS Sister Study](#) cohort. His group found that changes in methylation status were associated with age, suggesting that epigenetic changes that occur during the aging process may influence an individual’s susceptibility to cancer.

[Kimberly McAllister, Ph.D.](#), from the Susceptibility and Population Health Branch of the Division of Extramural Research and Training (DERT), highlighted work from NIEHS grantees exploring gene-environment interactions and their impact on human health. The program focuses on developing methods to explore these interactions, as well as conducting workshops and lecture series to highlight the field.

Continuing the tradition that began at last year’s Science Day, former NIEHS trainee [Mohamed Trebak, Ph.D.](#), now at the SUNY College of Nanoscale Science and Engineering, concluded the oral



*NIEHS Deputy Director Richard Woychik, Ph.D., welcomed everyone to this year’s Science Day. (Photo courtesy of Steve McCaw)*



*Abramowitz helps organize Science Day events each year. (Photo courtesy of Steve McCaw)*



presentations by describing his recent work examining the role that calcium signaling plays in endothelial cell function in the blood vessels. His group has found novel roles for the STIM1, Orai1, and TRPC channels in regulating endothelial cell permeability.

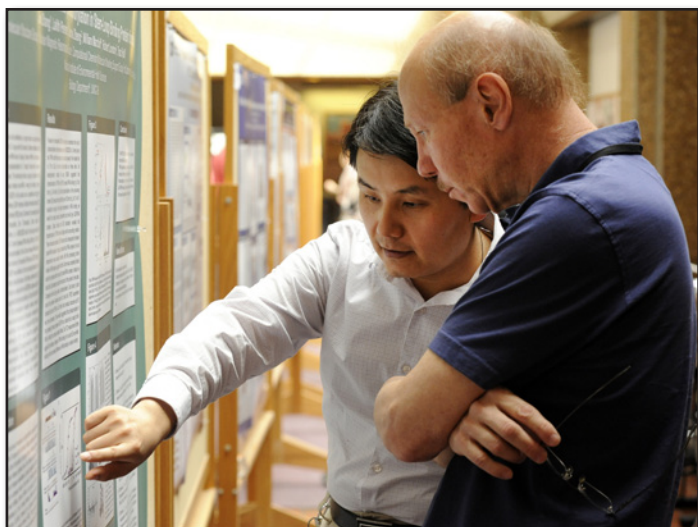
### **Awardees recognized for their outstanding research and mentoring**

The NIEHS Trainees Assembly (NTA) presented two awards, highlighting the excellent research and training received by the trainees at NIEHS. Kymberly Gowdy, Ph.D., of the NTA, presented the Mentor of the Year Award to [Dale Sandler, Ph.D.](#), Epidemiology Branch chief and head of the Chronic Disease Epidemiology Group within DIR, for her “excellence and commitment to research, the epidemiology branch, and training.” The 2nd Annual Fellow of the Year Award was presented to [Steven Roberts, Ph.D.](#), from the Chromosome Stability Group, who was acknowledged by senior associate scientist Dmitry Gordenin, Ph.D., as being in the “top tier of postdocs that I have mentored.”

This year, the number of Outstanding Poster Presentation Awards was increased to nine, with winners representing multiple labs within DIR and the NIEHS Office of Clinical Research ([see text box](#)). The Outstanding Oral Presentation Award was presented to [Sabrina Robertson, Ph.D.](#), from the Developmental Neurobiology Group in DIR. Her presentation, “Developmental Origins of Central Norepinephrine Neuron Diversity,” described the identification and manipulation of different subtypes of norepinephrine neurons, which may have implications for the response of these neurons in diseases and to environmental stimuli.

### **2013 Outstanding Poster Presentation Awardees**

1. Matthew Young, Ph.D., Laboratory of Molecular Genetics, “The complexity of heterozygous POLG2 mutations associated with human mitochondrial disease.”
2. Steven Roberts, Ph.D., Laboratory of Molecular Genetics, “Hyper-mutation of single stranded DNA across yeast and cancer genomes.”
3. Benjamin Scruggs, Ph.D., Laboratory of Molecular Carcinogenesis, “Pausing of RNA polymerase II at enhancers.”
4. Salik Hussain, Ph.D., Office of Clinical Research, “Human bronchial epithelia exposure to multi-walled carbon nanotubes induces inflammasome-dependent pyroptosis and a profibrotic response.”
5. Brad Lackford, Laboratory of Molecular Carcinogenesis, “Fip1 regulates mRNA alternative polyadenylation to promote stem cell self-renewal.”
6. Shannon Farris, Ph.D., Laboratory of Neurobiology, “Spatial exploration induces immediate early gene expression in rat hippocampal area CA2.”
7. Monica Frazier, Ph.D., Laboratory of Molecular Genetics, “Mutational consequences of dgt overexpression.”
8. Sylvia Hewitt, Laboratory of Reproductive and Developmental Toxicology, “Mouse models to evaluate estrogen receptor- $\alpha$  DNA binding dependent signaling mechanisms: ERE binding deficient vs. DNA binding deficient.”
9. YuanYuan Li, Ph.D., Biostatistics Branch, “T-KDE: a method for genome-wide identification of constitutive protein binding sites from multiple ChIP-seq data sets.”



*Jun Zhang, Ph.D., a visiting fellow in the NIEHS Laboratory of Structural Biology (LSB), explained his latest work to LSB staff scientist William Beard, Ph.D. (Photo courtesy of Steve McCaw)*



*NIEHS Laboratory of Respiratory Biology research fellow Hideki Nakano, Ph.D., left, described the techniques he used to study pulmonary dendritic cells to Biostatistics Branch staff scientist Weichun Huang, Ph.D. (Photo courtesy of Steve McCaw)*



*Last year's Outstanding Oral Presentation Award winner George Fromm, Ph.D., and his mentor, Karen Adelman, Ph.D., listened intently to this year's oral presentations. (Photo courtesy of Steve McCaw)*



*Kin Chan, Ph.D., is an IRTA fellow in the NIEHS Laboratory of Molecular Genetics, and was part of the group of presenters speaking on the second day of the event.*



*Auerbach represented NTP during his presentation at this year's Science Day festivities. (Photo courtesy of Steve McCaw)*



*James Putney, Ph.D., from the NIEHS Laboratory of Signal Transduction, was delighted to hear about the recent work from his former trainee Trebak. (Photo courtesy of Steve McCaw)*



(Heather Franco, Ph.D., is an Intramural Research Training Award (IRTA) postdoctoral fellow in the NIEHS Reproductive Developmental Biology Group of the Laboratory of Reproductive and Developmental Toxicology.)

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## Toxicogenetics Challenge winners announced

*By Ernie Hood*

The winning teams for the [NIEHS–NCATS–UNC DREAM Toxicogenetics Challenge](#), a competition involving crowdsourced computational challenges to find better ways to predict the toxicity of chemicals, were announced in Toronto Nov. 8 at the Sixth Annual RECOMB/ISCB [Conference](#) on Regulatory and Systems Genomics, with DREAM Challenges. NIEHS Deputy Director Richard Woychik, Ph.D., chaired the meeting's Challenge session and introduced the speakers from the winning teams.

The competition June 11–Sept. 15 was co-sponsored by NIEHS, the National Center for Advancing Translational Sciences ([NCATS](#)), the [Carolina Center for Computational Toxicology](#) at the University of North Carolina at Chapel Hill, [DREAM](#) (Dialogue for Reverse Engineering Assessments and Methods), and [Sage Bionetworks](#).

The sponsors provided data for two related subchallenges — (1) to develop a model that accurately predicts individual responses to compound exposure based on genomic information, and (2) to develop a model that accurately predicts how a particular population will respond to certain types of chemicals. Teams were free to submit to one or both of the subchallenges.

Subchallenge 1 generated 99 submissions from 34 teams. Subchallenge 2 received 85 submissions from 24 teams.

### The envelopes, please

Teams from the Quantitative Biomedical Research Center ([QBRC](#)) at the University of Texas Southwestern Medical Center (UTSW) were named best performer in both of the subchallenges.



Winners and representatives of some of the sponsoring organizations of the Toxicogenetics Challenge posed for a celebratory photo at the conference. Left to right: Ivan Rusyn, M.D., Ph.D., UNC; Wang; Federica Eduati, Ph.D., European Bioinformatics Institute; Woychik; Xie; Fred Wright, Ph.D., North Carolina State University. (Photo courtesy of Lisa Murzin)



Bernard, center, received the second best performer award for Team Cassis. She is flanked by Woychik, left, and Gustavo Stolovitzky, Ph.D., from the IBM Computational Biology Center. Stolovitzky represented DREAM, one of the challenge organizers. (Photo courtesy of Lisa Murzin)



Team Yang Lab, represented in Toronto by Ph.D. student Tao Wang, took the honors for subchallenge 1. Team QBRC, also represented in Toronto by Tao Wang, on behalf of assistant professor Hao Tang, Ph.D., came in first in subchallenge 2. Associate professor Yang Xie, Ph.D., was also there to accept the award. The second best performer for subchallenge 1 was Team Cassis from the [Centre for Computational Biology](#) in Paris, which was represented at the conference by team member Elsa Bernard, a Ph.D. student at the [Institut Curie](#), one of the Centre's joint laboratory member institutions.

### Challenge-focused seminar

NIEHS will hold a seminar "Crowdsourcing Tox21 Qualitative High Throughput Screening Data" Dec. 2 from 10:30 a.m.-12:00 p.m., which will focus on the challenge. The event will feature presentations that describe the Tox21 study that generated the data leading to the Challenge, and the prediction models that won the two subchallenges. Part 1, "The 1000 genomes toxicity screening project: Utilizing the power of human genome variation for population-scale *in vitro* testing," will be presented by Nour Abdo, a doctoral student at the University of North Carolina at Chapel Hill (UNC). Part 2, "Estimating population-scale toxicities for environmental chemicals from genomic and chemical information," will be presented by Tang. There will be a live webcast of the seminar.

(Ernie Hood is a contract writer with the NIEHS Office of Communications and Public Liaison.)

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## Toxicology symposium highlights the flip sides of nanomaterials

*By Sheila Yong*

In the midst of Halloween spirit, attendees of the Duke University [Integrated Toxicology and Environmental Health Program \(ITEHP\)](#) symposium, which is cofunded by NIEHS, gathered to hear the latest findings on the consequences of exposure to nanomaterials in the environment. Held at the Sarah P. Duke Gardens Oct. 31, the symposium was moderated by Mark Wiesner, Ph.D., and Richard Di Giulio, Ph.D.

Wiesner is the director of Duke's National Science Foundation-funded [Center for the Environmental Implications of NanoTechnology \(CEINT\)](#), which partners with the NIEHS-funded Duke University Superfund Research Program. Di Giulio is the director of ITEHP.



*Woychik chaired the session devoted to the Toxicogenetics Challenge at the meeting, and had the pleasure of presenting the results and announcing the winners of the two subchallenges. (Photo courtesy of Lisa Murzin)*



*The ITEHP symposium attracted participants from Duke, as well as other universities and research institutes in the Triangle, including NIEHS and the U.S. Environmental Protection Agency. (Photo courtesy of Steve McCaw)*

This year's symposium, "Rapidly Emerging Nanomaterials: Insuring Human and Environmental Health," featured presentations on nanomaterial synthesis and properties, as well as the effects of nanomaterial use on living organisms and the ecosystem ([see text box](#)). "The topic today is scary," said Wiesner, as he welcomed the attendees. It was scary indeed, as speakers showcased their findings on how nanomaterial use might negatively impact the environment and well-being of humans and other organisms.

### Nanomaterials are beneficial, or are they really?

Talks by Andre Nel, Jamie Lead, and Kam Leong focused on the use of different types of nanomaterials in various applications, and the effects their properties may have on living cells and tissues. Nel pointed out that many of these characteristics actually do more harm than good. He urged the use of high throughput screening of nanomaterials to characterize their risks and predict exposure outcomes, which could be helpful in regulating nanomaterial synthesis and use.

Lead discussed how nanomaterials of various sizes and properties behave in different solutions, such as those found in various environmental and biological systems. He explained that the stability of nanomaterials depends on what they are made of, and the coating used can also affect their characteristics in solution. Acknowledging Nel's comment on nanomaterial screening, Lead said, "There needs to be a balance between the science and regulation."

Kam Leong's talk brought the audience back to the benefits of nanomaterial use. His research focuses on using nanotechnology to create a safe and cost-efficient gene delivery method to treat hemophilia, a bleeding disorder that slows down the blood clotting process.

### Nanomaterials in the ecosystem

In the lab, scientists often use reagents at levels far beyond the normal range encountered in the environment. Emily Bernhardt emphasized, however, that nanomaterials could still create havoc in the ecosystem even at extremely low concentrations.

## Fall 2013 ITEHP Symposium speakers list

- [Andre Nel, M.D., Ph.D.](#),  
University of California, Los Angeles  
*Nanomaterials and Human Health: The Good and the Bad*
- [Jamie Lead, Ph.D.](#),  
University of South Carolina  
*Dynamic Transformations of Manufactured Nanoparticles in Complex Environmental and Biological Media*
- [Tara Sabo-Attwood, Ph.D.](#),  
University of Florida  
*Close Encounters of an Infectious Kind: The Influence of Nanoparticles on Pathogens*
- [Joel Meyer, Ph.D.](#),  
Duke University  
*Using Genetic and Microscopic Analysis to Understand Mechanisms of Silver Nanoparticle Toxicity in *Caenorhabditis elegans**
- [Emily Bernhardt, Ph.D.](#),  
Duke University  
*Nanomaterials in the Real World – Nanomaterial Impacts in Ecosystems*
- [Amy Ringwood, Ph.D.](#),  
University of North Carolina at Charlotte  
*Lysosomes as Targets for Nanoparticles – Cellular and Ecotoxicological Models*
- [James Bonner, Ph.D.](#),  
North Carolina State University  
*Nanomaterials as a Potential Cause of Lung Disease*
- [Kam Leong, Ph.D.](#), Duke University  
*Quantum Dots Applied to Improve Theranostics of Nanotherapeutics*

Organized by Duke environmental toxicologist [Edward Levin, Ph.D.](#), and ITEHP Program Manager Eve Marion, the ITEHP annual symposium series features daylong events in the fall and spring of each year.



Amy Ringwood agreed with Bernhardt's view. "Instead of waiting for the consequences to occur, can we be proactive for a change?" she asked. Using oysters as her model, Ringwood found that filter feeders, who obtain food by filtering particles from water, could ingest and excrete agglomerated, or clustered, nanoparticles, leading to resuspension and reexposure. Therefore, once in the ecosystem, nanoparticles never go away.

### **Nanomaterial effects at the cellular and organismal levels**

Former NIEHS trainees Tara Sabo-Attwood, Joel Meyer, and James Bonner discussed the effects of nanoparticle exposure on cells and living organisms. Meyer and Bonner are also NIEHS grantees.

Sabo-Attwood and Bonner study nanoparticle exposure effects on the respiratory system. Explaining that many nanoparticles are airborne and may cause respiratory diseases, Sabo-Attwood showed that lung epithelial cells exposed to nanotubes are more susceptible to influenza virus infection, suggesting that nanotube exposure may alter host immunity. "We plan to use animal models to determine the mechanism of infection and if there is any nanoparticle-specific effect," she added.

Bonner studies the health risks associated with occupational and environmental exposure to carbon nanotubes. He showed that mice that inhaled carbon nanotubes developed airway and lung irritation, which often precedes respiratory diseases, such as asthma and mesothelioma.

Meyer found that nanoparticles cause lysosomal toxicity in the nematode *C. elegans*, identifying mutants that are sensitive to toxicity from dissolved metals and nanoparticle-induced oxidative stress. Interestingly, some of these toxic effects are nanoparticle-specific, and are more prominent in certain genetic backgrounds. "The interesting question is how we can incorporate the genetic variability among the population into the toxicological assessment of nanoparticles," he said.

(Sheila Yong, Ph.D., is a visiting fellow in the NIEHS Laboratory of Signal Transduction.)



*Nel, an NIEHS grantee through the NanoHealth and Safety program, started off the day's program with his talk on nanomaterials and human health. "Many properties of nanomaterials are actually detrimental to the cells, such as their ability to produce reactive oxygen species and cause chronic toxicity," he explained. (Photo courtesy of Steve McCaw)*



*Besides giving the welcome speech, Wiesner also served as an emcee for the symposium and introduced several of the speakers before their presentations. (Photo courtesy of Steve McCaw)*



*Di Giulio introduced Meyer, right, while he was getting slides ready for his presentation. Meyer, now an assistant professor of environmental toxicology at Duke, obtained his Ph.D. from Di Giulio's lab. (Photo courtesy of Steve McCaw)*





*Bernhardt showed that aquatic wetland plants die when exposed to silver nanoparticles in the water. “Their roots dissolved, and the plants spilled their guts out,” she said. These phenomena eventually result in increased levels of nanoparticle aggregates and greenhouse gases in the environment. (Photo courtesy of Steve McCaw)*



*Ringwood introduced the audience to the hepatopancreatic cells that make up the oysters’ gut. She explained that the gut of filter feeders is the first to encounter any pollutant or toxin in the environment. She showed that nanoparticles enter the oysters and accumulate in the lysosomes, which are intracellular vesicles containing degradative enzymes. This response results in lysosomal disruption and reduction of embryonic viability. (Photo courtesy of Steve McCaw)*



*Bonner studies the potential of nanoparticles to cause lung disease. “There are no human diseases identified so far, but susceptible individuals will be affected first,” he said. (Photo courtesy of Steve McCaw)*



*Sabo-Attwood responded to questions from the audience after her presentation. Her group at the University of Florida studies the effects of nanoparticle exposure on pathogenic infection. (Photo courtesy of Steve McCaw)*

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# Expert panel concurs with conclusions in draft NTP technical reports

By Ernie Hood

An expert panel, convened by NTP Oct. 29, peer reviewed four [draft technical reports](#) and agreed with the NTP conclusions on the carcinogenicity and toxicity of the substances tested. The proceedings were webcast, and included presentations of study findings, public comments, peer-review comments, and panel discussions for each report.

The meeting kicked off with a briefing from NTP toxicologist Chad Blystone, Ph.D., who provided background information on the reports and the peer review process. The reports summarize NTP rodent toxicity and cancer studies on substances in our environment of public health concern to identify potential hazards for human health. They describe the methods, results, and draft NTP conclusions as levels of evidence — clear evidence, some evidence, equivocal evidence, no evidence or inadequate study — of carcinogenic activity under the specific conditions of the studies.

The peer reviewers were charged with evaluating the scientific and technical elements of each study, as presented in the draft technical report, and determining whether the study's experimental design, conduct, and findings support the conclusions. For each report, the peer-review panel provided their comments and discussed the study's findings and conclusions. NTP staff acknowledged the comments and responded to points raised by the panel. The panel voted to accept the draft conclusions, as written, in all four reports.

## Vinylidene chloride

Vinylidene chloride is a high production volume chemical used to make common household products, artificial turf, pipes, lacquer resins and latex, and flame-resistant carpet backing. It was nominated for NTP study by the Agency for Toxic Substances and Disease Registry, primarily due to occupational exposure. Under the conditions of the two-year inhalation study, the NTP concluded that there was clear evidence of carcinogenic activity in male rats, some evidence in female rats, and clear evidence in male and female mice.



*The NTP technical report peer-review meeting included the seven members of the peer review panel, liaisons to the U.S. Food and Drug Administration and the NTP Board of Scientific Counselors, and NTP study scientists and pathologists for each of the four technical reports. (Photo courtesy of Steve McCaw)*



*NTP Laboratory Animal Management Group lead Angela King-Herbert, D.V.M., detailed changes in the rat models used by NTP in its technical reports studies. (Photo courtesy of Steve McCaw)*



## Cobalt metal

Cobalt metal was nominated by the Cobalt Development Institute, as well as the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America, better known as the United Automobile Workers, based on widespread occupational exposure and occurrence of hard metal disease associated with exposure to cobalt and its compounds. More than one million U.S. workers are potentially exposed to cobalt, primarily through skin or inhalation exposures. It is also present naturally in soil, groundwater, and sediments, and is an essential trace element found in vitamin B12. The panel agreed with the NTP draft conclusions of clear evidence of carcinogenic activity of cobalt metal in male and female rats and mice.

## Glycidamide

Glycidamide is a metabolite of acrylamide, the known carcinogen found in certain baked and fried starchy foods, such as french fries and potato chips. When acrylamide is consumed through food, the body converts it to glycidamide. Under the conditions of the two-year drinking water study, NTP concluded that there was clear evidence of carcinogenic activity in male and female rats and mice.

## Tetrabromobisphenol A (TBBPA)

Nominated by NIEHS, TBBPA is a high production volume flame retardant widely used in plastics, paper, electronics, textiles, and adhesives. It is present in a variety of household products, such as computers, televisions, and mobile phones. The two-year gavage, or direct oral administration, studies yielded clear evidence of carcinogenic activity in female Wistar Han rats, equivocal evidence in male Wistar Han rats, some evidence in male mice, and no evidence in female mice.

In addition to the standard carcinogenicity studies, molecular characterization of select tumors was included in three of the four draft technical reports. These data separated spontaneous tumors from those in chemical-exposed groups. The panel reviewed the studies positively and encouraged further NTP molecular studies.

(Ernie Hood is a contract writer with the NIEHS Office of Communications and Public Liaison.)



*From left, panel members Norman Barlow, D.V.M., Ph.D., of Sanofi-Aventis, U.S.; Deborah Slechta, Ph.D., of the University of Rochester; and Russell Cattley, V.M.D., Ph.D., of Auburn University, paid close attention to the presentations outlining the conclusions reached by NTP on each of the four tested chemicals. (Photo courtesy of Steve McCaw)*



*Contemplating their response to a reviewer's question, NTP vinylidene chloride study scientist Michael Wyde, Ph.D., left, conferred with study pathologist Mark Hoenerhoff, D.V.M., Ph.D. (Photo courtesy of Steve McCaw)*





*John Cullen, V.M.D., Ph.D., right, professor of veterinary pathology at the North Carolina State University College of Veterinary Medicine, chaired the peer review panel. He is shown with NTP Associate Director John Bucher, Ph.D. (Photo courtesy of Steve McCaw)*



*Peer review panel members Terry Gordon, Ph.D., left, of the New York University Langone Medical Center, and Karen Regan, D.V.M., of Research Pathology Services LLC, participated in the sometimes lively discussions through the course of the day's meeting. (photo courtesy of Steve McCaw)*

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## Science Day training awards honor mentor and fellow of the year

*By Monica Frazier*

As part of the 11th annual NIEHS Science Day Nov. 7-8, awards were presented for Mentor of the Year and Fellow of the Year, in recognition of the importance of quality training at NIEHS. The recipients are chosen by the NIEHS Trainees Assembly (NTA), from nominations received from staff throughout the Institute.

### Mentor of the Year

Dale Sandler, Ph.D., principal investigator and chief of the Epidemiology Branch, was selected as Mentor of the Year. Hazel Nichols, Ph.D., Sandler's nominator and research fellow, presented the award. Nichols explained that, although she joined Sandler's lab for the science, her interactions with Sandler have given her an exceptional mentoring experience. "Dale is the most complete role model I've encountered," she said.

Nichols read excerpts from some of the additional letters of support for Sandler's nomination, and it was clear that, among other attributes of a good mentor, Sandler is excellent at guiding her scientists and staff, without hindering their individual development. She has provided networking and career development opportunities, supported career transitions even if they occurred unexpectedly, and provided exceptional scientific and personal support.



*NIEHS 2013 Mentor of the Year Sandler, right, joined Nichols, a research fellow in Sandler's group who nominated her for the award. (Photo courtesy of Steve McCaw)*

## Fellow of the Year

Steven Roberts, Ph.D., an Intramural Research Training Award fellow in the Chromosome Stability Group (CSG), was named the second annual Fellow of the Year. The award recognizes extraordinary qualities in trainees that will prepare them for a well-rounded research career, such as passion for and dedication to research, demonstration of leadership excellence and service, congeniality, science communication aptitude, and mentoring ability. In addition to the recognition, Roberts received a \$1,000 travel grant to use for attending the scientific meeting of his choice.

Roberts was nominated by Dmitry Gordenin, Ph.D., senior associate scientist in CSG, who presented the award, saying Roberts was one of the best postdocs he had ever mentored in his scientific career. In his nomination, Gordenin wrote, “Roberts has a rare combination of creativity, talent, and insight, combined with great work capability, work ethic, and scrupulousness” — qualities all fellows should aspire to have.

(Monica Frazier, Ph.D., is an Intramural Research Training Award fellow in the NIEHS Mechanisms of Mutation Group.)

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*NIEHS 2013 Fellow of the Year Roberts, right, accepted his award from his nominator, mentor, and frequent co-author Gordenin. Gordenin's description of Roberts as a scientist and a person was a persuasive argument that he most certainly deserved the recognition. (Photo courtesy of Steve McCaw)*

## Tenure awarded to two NIEHS lead researchers

*By Ernie Hood*

Achieving tenure is a rare accomplishment for an NIH scientist, but on Nov. 18, two NIEHS Division of Intramural Research (DIR) scientists — Honglei Chen, M.D., Ph.D., and Michael Fessler, M.D. — were granted tenure by the NIH Central Tenure Committee.

“It was a really good day for DIR,” said NIEHS Scientific Director Darryl Zeldin, M.D. “The bar at NIH Central Tenure is quite high and the committee is very rigorous, so it’s truly unique to get two in one day.”

### Fessler’s adventure in innate immunity

[Fessler](#) is lead researcher in the Clinical Investigation of Host Defense Group in the Laboratory of Respiratory Biology (LRB). His group investigates the role of cholesterol trafficking and lipid rafts in innate immunity, and uses proteomic and translational approaches to discover and validate novel insights into the innate immune response. Fessler received an A.B. from Princeton University in 1992, and an M.D. from Harvard Medical School in 1996. He trained in internal medicine at Massachusetts General Hospital and pulmonary/critical care medicine at the University of Colorado, before being recruited in 2006 to join NIEHS as a physician-scientist specializing in immunology.

“He’s made several important discoveries on how cholesterol trafficking affects the lung response to environmental factors, and how lung immune responses occur,” said Zeldin. “He’s a great example of a translational investigator who learns about diseases at the bedside, goes back to the lab and tries to understand



basic mechanisms using cell systems and animal models, and then takes what he learns in the lab back to humans to develop novel approaches to treat or prevent disease.”

LRB Chief Anton Jetten, Ph.D., agreed. “Dr. Fessler’s lab has advanced our understanding of how genetic and environmental determinants of cholesterol homeostasis regulate immune responses to the environment,” he said. “We are very happy that he has been awarded tenure, and expect that his future research efforts will make many exciting contributions to this field.”

“I expect that tenure and acceptance as a senior investigator will allow me to take my research program to the next level,” said Fessler. “It’s the culmination of an adventurous and formative period in my research career. Coming to NIEHS gave me unique opportunities and protected time to take scientific risks and to test hypotheses. Achieving tenure is clearly a signpost that our program was on target.”

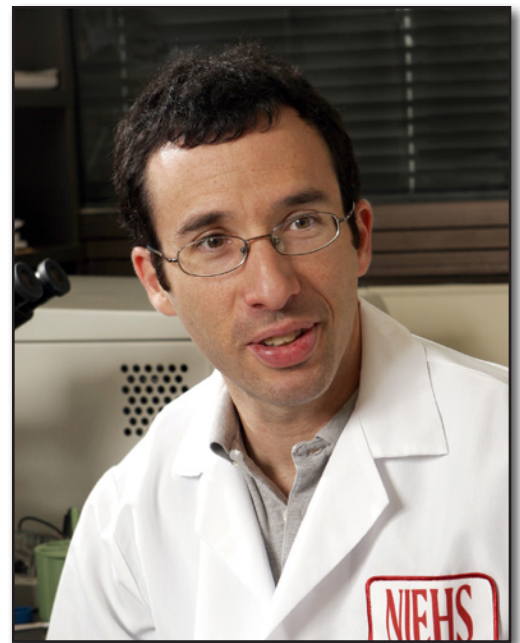
### Chen champions neuroepidemiology

**Chen** is head of the Aging and Neuroepidemiology Group in the Epidemiology Branch, which studies how environmental and genetic factors affect the risks of age-related neurodegenerative diseases, and the aging process in general. His current research focuses on Parkinson’s disease.

Branch Chief Dale Sandler, Ph.D., said that the branch is thrilled Chen has become a tenured investigator. “Dr. Chen has successfully built an internationally recognized and highly productive independent research program on aging and neuroepidemiology,” she said. “His work on Parkinson’s is of central interest to NIEHS, because of the likelihood of environmental influences, and the need to identify specific causes and preventive strategies.”

Chen came to NIEHS in 2005, after a stint at the Harvard School of Public Health. He received his M.D. at Tianjin Medical University in 1993, a master’s degree in 1996 from the Chinese Academy of Preventive Medicine, and a Ph.D. from Tufts University in 2001.

“Dr. Chen was recruited in 2005 to enhance the neuroepidemiology part of our portfolio, primarily to look at how the environment influences neurodegenerative disease,” said Zeldin. “He’s built a number of unique studies that allow us to examine the role of a variety of environmental factors in Parkinson’s disease etiology. He’s amazingly productive, and he’s made some major discoveries about Parkinson’s disease risk.”



*Asked what the impact of achieving tenure would be on his research, Fessler noted, “While you have to remain focused as a senior investigator, I believe that you are now in a position to build upon both the depth and breadth of your research program. While I plan to continue with my existing program goals, I also expect that I will take new directions and continue my growth as a scientist.” (Photo courtesy of Steve McCaw)*



*Asked how tenure would help advance his science, Chen said, “You will be more recognized in your field, and you can spend more time to think about long-term strategy and long-term goals in your research.” (Photo courtesy of Steve McCaw)*



“Before you get tenure, you really want to establish yourself fast, and get publications out, and attend as many meetings as possible, and let people know you,” said Chen. “You still have to do all of those things after tenure, but on the other hand you can think more deeply about the most important questions in your field and expand your research in a more strategic way.”

(Ernie Hood is a contract writer with the NIEHS Office of Communications and Public Liaison.)

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## Using DNA methylation to examine epigenetic changes

*By Robin Arnette*

Before the advent of epigenetics, the study of heritable changes that don't alter DNA sequence, scientists wondered how genetically identical organisms could display different physical characteristics. It turns out that environmental exposures, such as cigarette smoke, pollution, or even nutritional intake, place chemical tags on DNA that alter gene function. Among the best studied DNA tags is the addition of a methyl group, or methylation.

One researcher who is studying the effects of DNA methylation on gene function is Cathrine Hoyo, Ph.D., associate professor and chief of the Division of Clinical Epidemiology in the Department of Obstetrics and Gynecology at Duke University School of Medicine. She came to the Institute Nov. 18 to present “Testing the Developmental Origins of Adult Diseases Hypothesis: The Durham Newborn Epigenetics Study,” as part of the Keystone Science Lecture Seminar Series. Cindy Lawler, Ph.D., branch chief of the Genes, Environment, and Health Branch in the NIEHS Division of Extramural Research and Training, hosted the talk.

### Gene inactivation is necessary for normal development

**Hoyo** studies insulin-like growth factor 2 (IGF2), a gene required for proper embryonic and fetal growth. Unlike the majority of human genes, IGF2 undergoes an essential physiological process called imprinting, in which one allele, or copy of the gene, is epigenetically silenced, usually through methylation.

In designing her experiments, Hoyo theorized that since the working copy of IGF2 should not be methylated, and the inactive copy should be 100 percent methylated, she should be able to detect any measurable deviation in IGF2 methylation levels in response to environmental stress.

“Previous research has shown that children born to mothers who smoked during pregnancy exhibit lower birth weights,” Hoyo said, “so we wanted to see if we could do a study looking for epigenetic changes using DNA methylation.”



*One year after gathering samples from newborns in the study, Hoyo and her team members obtained the infants' height and weight, new diagnoses through medical records, and updated contact information. They are currently doing a 3-5 year update, and will do another when the children reach age 7. (Photo courtesy of Steve McCaw)*

Hoyo and her collaborators not only wanted to examine DNA methylation in response to cigarette smoke, but also other environmental exposures, such as psychotropic drugs, folic acid, and organic and inorganic compounds. To measure human exposures, as early as they possibly could, the team focused on the prenatal environment.

### **The Newborn Epigenetics Study**

The [Newborn Epigenetics Study \(NEST\)](#) was made up of two cohorts of pregnant women — one with 1,000 participants and another with 2,500. The research team isolated DNA from 2,300 samples of umbilical cord blood at birth and analyzed IGF2 methylation patterns.

Among women who smoked during pregnancy, Hoyo saw significant differences in IGF2 DNA methylation levels that were also accompanied by slight gene expression differences. She also saw an association between lower infant IGF2 DNA methylation born to women who had taken folic acid before and during pregnancy, consistent with a threshold effect.

Further analysis of circulating maternal folate revealed a similar pattern of association between folate levels and DNA methylation at multiple differentially methylated regions, including IGF2 regulatory sequences.

“Those that had moderate amounts of folate had a lower DNA methylation profile compared to those with the lowest levels of folate,” Hoyo said.

By following the children over several years, Hoyo will be able to determine if these differences in methylation, which are driven by *in utero* exposures, can be evaluated in relation to common chronic diseases including autism. Lawler, who oversees extramural research involving autism, believes the work has great promise for helping determine whether altered DNA methylation that may occur as a result of environmental exposures contributes to neurodevelopmental conditions, such as autism spectrum disorders.

“There is a growing body of scientific literature that suggests improper methylation could be playing a role in the expression of genes vital to normal brain development,” Lawler said. “Hoyo’s analysis may shed new light on a possible link.”

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## **GEMS meeting focuses on preventing and curing cancer**

*By William Kaufmann and Eddy Ball*

The [Genetics and Environmental Mutagenesis Society \(GEMS\)](#) held its 31st annual fall meeting Nov. 14 at the Sheraton Imperial Hotel and Convention Center in Research Triangle Park, N.C. The meeting, supported in part by grants from NIEHS, was organized around the theme “Exploiting the DNA damage response to prevent and cure cancer.”

The event was organized and moderated by GEMS President-elect [William Kaufmann, Ph.D.](#), who opened the meeting on an optimistic note. “We’d all like to find a way we can prevent or cure it [cancer],” he said. “It’s a rather lofty goal, but one we know is attainable.”

“A large fraction of cancers are cured simply by surgery,” he explained. The metastases that escape the surgeon’s knife represent our biggest problem.”

“The other side of it is prevention,” Kaufmann continued. A great part of the challenge is identifying exposures and metabolic processes that can be manipulated to stop cancer before it has a chance to begin.

### DNA damage responses: bedside to bench to bedside

Opening the program, Kaufmann introduced [Michael Kastan, M.D., Ph.D.](#), of Duke University, who described his work to translate discoveries about *TP53* and *ATM* to more effective treatments for cancer. He introduced an important new role of nucleolin in nucleosomal remodeling in support of repair of DNA double-strand breaks, and described the application of inhibitors or activators of p53 and ATM signaling to enhance therapy for cancer.

Pathways of DNA repair, and DNA damage checkpoints, protect against development of cancer, by reducing the levels of DNA damage or enhancing the time available for repair of the damage. These DNA damage responses not only protect against the development of cancer, but also protect cancer cells from radiation and chemotherapies that seek to cure the disease. The demonstration of synthetic lethalties, where a weakly toxic insult can be transformed into a highly toxic lesion by modification of gene expression, has renewed interest in the DNA damage response. Inhibitors of poly(ADP-ribose) polymerase have modest toxicity normally but, in cells with inactivation of BRCA1-dependent homologous recombination, these drugs have massive toxicity. New combinations of drugs to kill cancer cells with greater specificity are being developed.

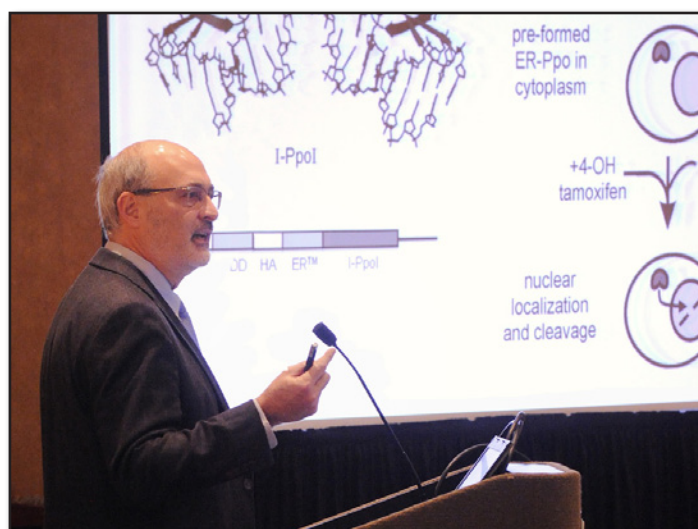


*“Cancer can be prevented,” Kaufmann assured the audience. That positive approach motivated Kaufmann to design the two-part series of meetings in 2013 that highlighted mechanisms of environmental carcinogenesis during the GEMS spring meeting ([see story](#)) and strategies for prevention and cure at the fall meeting. (Photo courtesy of Steve McCaw)*

### Potentiating Top1 poisons by modulating the DNA damage response

The meeting’s second speaker, [William Gmeiner, Ph.D.](#), of Wake Forest School of Medicine, described his efforts to make 5-fluorouracil a more effective chemotherapeutic drug, by creating polymers of the drug with longer lasting bioavailability. The improved polymers produce DNA lesions that bind DNA topoisomerase I (Top1) for enhanced cell killing, and are now being tested for more effective treatment of leukemia and lymphoma.

A remarkable discovery in the field of environmental carcinogenesis was the demonstration that the XPA nucleotide excision repair (NER) factor varied in its expression according to the time of day. Circadian regulation of NER in skin implies that human risk of skin cancer may vary with the time of harmful UV exposure. Circadian regulation of NER may also influence the efficacy of chemotherapies, and this implies that the timing of treatment — and standard of care — may need to be modified.



*Like many researchers and clinicians, Kastan is searching for the right combination of drugs to target cancer with as much efficacy and as few side effects as possible. (Photo courtesy of Steve McCaw)*



## Control of DNA repair and cancer by the circadian clock

The final speaker of the day, [Aziz Sancar, M.D., Ph.D.](#), of the University of North Carolina at Chapel Hill (UNC), reported on his efforts to define the role of the circadian clock in environmental carcinogenesis, and how clock mechanisms may be exploited to prevent or cure cancer.

Importantly, mice treated with UV, at a time of day when skin DNA repair was high and DNA replication was low, developed one-fifth as many skin cancers as mice treated twelve hours later, when DNA repair was low and DNA replication was high. Susceptibility to skin carcinogenesis varies according to the time of day in mice, and studies are underway to determine whether human skin also displays circadian variation in risk of UV carcinogenesis.



*Gmeiner is professor of physiology and pharmacology in the Cancer Biology Comprehensive Cancer Center and Brain Tumor Center of Excellence at Wake Forest School of Medicine. (Photo courtesy of Steve McCaw)*



*Kaufmann, left, started off the question-and-answer session that followed Sancar's presentation. Sancar is a distinguished professor of biochemistry and biophysics at UNC. (Photo courtesy of Steve McCaw)*



*Toxicologist Stephanie Smith-Roe, Ph.D., was one of many scientists from NTP and NIEHS attending the meeting. (Photo courtesy of Steve McCaw)*

## Nurturing the next generation

The GEMS fall meeting also featured four short talks and eight poster presentations by students and postdoctoral fellows. Judges selected first place winners in both categories.

- Jonathan Hall, Ph.D., of North Carolina State University, won best short talk. Along with his plaque, Hall received a \$1,000 award to attend the 2014 Environmental Mutagenesis and Genomics Society meeting in Orlando, Fla. A trainee in the NIEHS-funded Cell Signaling and Cancer Group headed by [Robert Smart, Ph.D.](#), Hall spoke on CCAAT/enhancer binding protein (C/EBP) regulation of p21CIP1/WAF1 proteins during the UVB-induced DNA damage checkpoint response.
- Scott Lujan, Ph.D., of NIEHS, won a \$100 check for best poster presentation. A trainee in the DNA Replication Fidelity Group headed by lead researcher and structural biologist [Thomas Kunkel, Ph.D.](#), Lujan presented findings from his work, "Genome architecture and dynamics drive mutagenesis via replication infidelity." Lujan was first author on the study, a collaboration among 11 structural biologists, molecular geneticists, and biostatisticians at NIEHS.





*Among board members honored for their service by GEMS President Thomas Hughes, right, was retired NTP scientist Barbara Shane, Ph.D., a 2011-2013 GEMS councilor. (Photo courtesy of Steve McCaw)*



*NIEHS Scientific Review Officer Rose Anne McGee was recognized for her work as treasurer. She has also served as president of GEMS. (Photo courtesy of Steve McCaw)*



*After recognizing their board members, Kaufmann and Hughes presented honors to the first of their rising stars, Lujan, center. (Photo courtesy of Steve McCaw)*



*The climax of the awards ceremony was the presentation of a plaque and travel award to Hall for best short talk. (Photo courtesy of Steve McCaw)*

(William Kaufmann, Ph.D., is a professor in the Department of Pathology and Laboratory Medicine, and a member of the Cancer Genetics Program at UNC.)

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# Zebrafish model may lead to new therapies for mitochondrial disease

By Monica Frazier

[Sherine Chan, Ph.D.](#), former NIEHS trainee and current assistant professor in the Department of Pharmaceutical and Biomedical Sciences at the Medical University of South Carolina (MUSC), spoke Nov. 15 at Duke University. Her presentation was part of the fall Integrated Toxicology and Environmental Health Program (ITEHP) seminar series.

Her talk on “Environmental Toxicant Exposures, Mitochondrial Dysfunction, and Birth Defects” attracted a capacity audience to the Levine Science Research Center at Duke, which houses ITEHP.

Chan, a former postdoc in the NIEHS [Mitochondrial DNA Replication Group](#), has been at MUSC for more than 4 years, and has developed her own group to advance the mitochondrial research interests she developed during her time at NIEHS, which has potential applications in a range of diseases linked to defects in energy production ([see text box](#)).

## The need for a new animal model of mitochondrial dysfunction

Chan opened her talk by saying, “The big problem with mitochondrial dysfunction is there are no cures, and there are no good treatments that are currently available on the market.” As she went on to explain, “One of the reasons why that might be is that there are no good animal models [for drug discovery].”

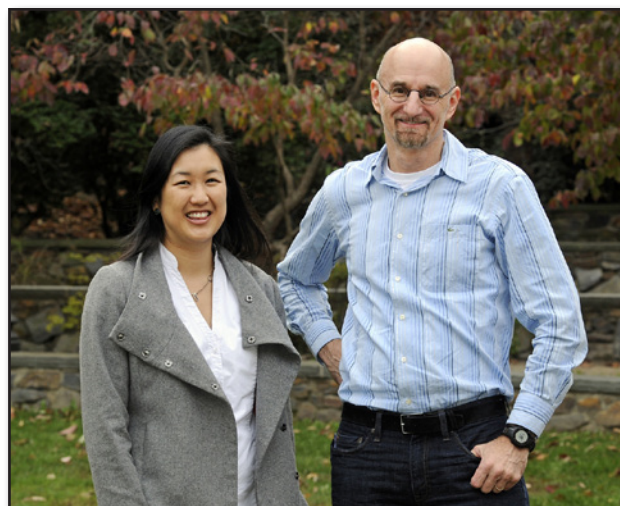
To address this issue, Chan has worked to develop strains of zebrafish for mitochondrial studies. Zebrafish are extremely valuable for developmental research, Chan explained, because once fertilized, they rapidly develop and hatch within three days. Because they are transparent, her research [group](#) can use a microscope to watch embryonic development during exposure to different environmental toxicants. One toxicant the group has studied, rotenone, is a naturally occurring mitochondrial-targeting organic pesticide often used in farming.

## Using zebrafish to determine mechanisms of birth defects and disease

The zebrafish model is particularly advantageous for Chan’s research, because one of her interests is looking for connections between mitochondrial dysfunction and birth defects. Since many birth defects are sourced to the heart or nervous systems, which use a lot of mitochondrial-generated energy, Chan suspects that mitochondrial dysfunction could have a significant impact on early development.



*Chan responded to questions from her audience. (Photo courtesy of Steve McCaw.)*



*Following her talk, Chan joined Copeland, right, one of many NIEHS researchers who made the trip to hear her seminar at Duke. (Photo courtesy of Steve McCaw.)*



Chan also detailed her study of epilepsy using zebrafish, and her search for an improved therapy using high-throughput zebrafish screens of potential compounds. Several promising compounds are being investigated by Chan's research group, in collaboration with MUSC chemist James Chou, Ph.D., and the National Institute of Neurological Disorders and Stroke [Anticonvulsant Screening Program](#). Their study was just accepted for publication in Neuroscience.

## Transitioning from postdoc to lead researcher — building independence

In less than five years after leaving NIEHS, Chan and her group at MUSC have developed a new model system for studying mitochondrial disease, and successfully incorporated that system to establish new findings in the field.

Chan's former mentor, Bill Copeland, Ph.D., head of the NIEHS Mitochondrial DNA Replication Group and chief of the Laboratory of Molecular Genetics, is not surprised by her successful transition into an independent academic career.

"Her ability and tenacity to try new systems, such as working in the zebrafish model, something that she started on her own after leaving NIEHS and without any prior training, is especially impressive," said Copeland. Chan took advantage of a diverse range of training opportunities, while at NIEHS, and the effective transfer of those learned skills is a key component to her success.

"I was pretty open and not set on any one career path, so I explored many options, which is one of the many great things about doing a postdoctoral fellowship at the NIEHS," Chan commented. After becoming a recipient of an NIH Pathway to Independence (K99/R00) award from NIEHS, she was excited to follow an academic path.

(Monica Frazier, Ph.D., is an Intramural Research Training Award fellow in the NIEHS Mechanisms of Mutation Group.)

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## Tox21 seminar highlights stem cell technology

*By Ernie Hood*

Scientists were given a glimpse into the near future at a Nov. 19 Tox21-sponsored seminar at NIEHS titled "Innovating Preclinical Drug Discovery."

The talk was presented by renowned stem cell researcher [Stephen Minger, Ph.D.](#), who is global head of research and development for cell technologies at GE Healthcare Life Sciences in the U.K. Minger's seminar was the latest in a series of talks, including ones by scientists involved in drug development, sponsored by NTP in its exploration of new methodologies with potential for advancing predictive toxicology for the Tox21 interagency consortium.

Minger described, in detail, his group's utilization of a human embryonic stem cell (hESC) line known as H7 that was derived from a single embryo, has been immortalized, and is genetically stable. "For us, this represents a treasure trove, because I can make cells from the same cell line every week for years, and provide them to customers and partners, and they will come from the same genome," he said.

## Focus on drug toxicity

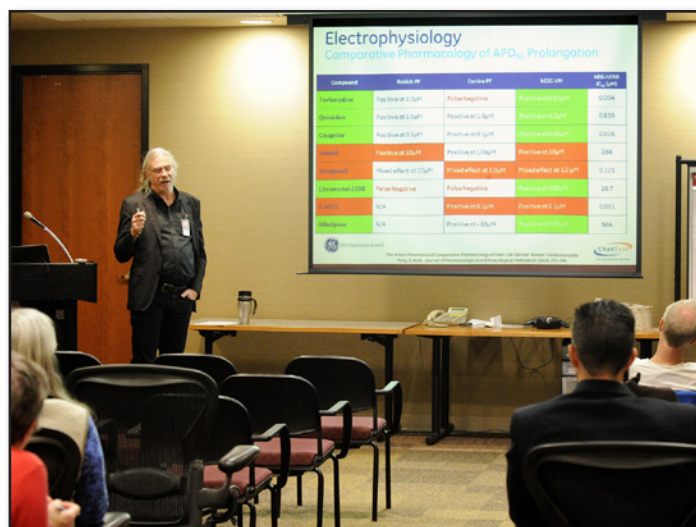
According to Minger, the driving force for the characterization of the H7 hESC line was to help address a major problem facing big pharmaceutical companies. “Every year, pharma will spend billions of dollars taking compounds through preclinical development using animal cells, tumor lines, and animal models [into] Phase I, Phase II, and Phase III trials. Drugs get licensed by the FDA, and then they have to be withdrawn or have their use significantly curtailed because of unforeseen cardiotoxicity.”

The H7 hESC line, along with the high content analysis (HCA) cell imaging tools his company has developed, offers a potential solution to help the drug companies screen candidate compounds for even subtle signs of cardiotoxicity very early in the drug development process. This could potentially save hundreds of millions, or even billions, of dollars, not to mention tens of thousands of lives, by allowing early cessation of development of problematic drugs.

“We’ve developed a protocol where we take about 5 billion undifferentiated human ES cells – these are cells that can turn into any cell type in the body – and we direct their differentiation using a series of cytokines and small molecules to first commit to being mesoderm, one of the three primary germ layers that gives rise to the heart,” Minger said. The cells are eventually matured into highly functional adult cardiomyocytes, or cardiac muscle cells. A lot composed of 50 percent cardiomyocytes, along with smaller percentages of fibroblasts and nodal cells, is then produced. The cardiomyocytes beat in synchrony at 45-75 beats per minute.

“So, they look like human cardiomyocytes, and functionally they act like human cardiomyocytes. The big question is, are they predictive? That is, can I test compounds on them that looked clean all the way through development, but then failed post-licensing by the FDA?” Minger asked.

Working with a contract research organization that specializes in testing drugs for cardiac toxicity, studies showed that the cardiomyocytes are predictive. “I could have told the pharma companies on day one that, with a given compound, you’ve got a potential problem here,” he added.



*Minger presented data illustrating several of the tests his group and an independent contract research organization had run, comparing results from traditional assays and newly developed stem cell-based assays in detecting cardiac side effects caused by a variety of drugs, most of which had been removed from the market due to cardiac issues. The blinded tests showed that the cardiomyocytes would have detected the cardiac issues early in the compounds' development. (Photo courtesy of Steve McCaw)*

## Tox21 interest

NTP Biomolecular Screening Branch Chief Raymond Tice, Ph.D., said that Tox21 is already conducting high throughput screening studies, using differentiated human stem cells, and that the future applications described by Minger make a great deal of sense. “We’re being amazed every day by the new technologies and techniques that are being developed,” Tice said. “This presentation by Dr. Minger is another indicator of what the future will look like, in terms of our ability to perform toxicity testing that is more pertinent to human health.”



## Other applications

Minger's group is also working to develop methods to multiply human hematopoietic stem cells (HSCs), which are vital for bone marrow transplants and have proven resistant to *in vitro* expansion. Seeking a therapeutic agent to address that resistance, the group screened 122,000 compounds, in less than a year, using HCA imaging, and are now testing five compounds that show promise.

Minger noted that, essentially, his group is developing platform technology to allow for the expansion of any cells, whether for assay development or therapeutic applications. The group is currently working with several major research institutions and companies to advance the technology in several different cell types.

(Ernie Hood is a contract writer with the NIEHS Office of Communications and Public Liaison.)

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*Prior to joining GE Healthcare Life Sciences in 2009, Minger was director of the Stem Cell Biology Laboratory at King's College in London. There, his team generated the first human embryonic stem cell line in the U.K. and went on to produce other stem cell lines, including those containing mutations for cystic fibrosis and Huntington's disease. (Photo courtesy of Steve McCaw)*

## Delaware cleanup project makes use of NIEHS-funded technology

*By Sara Mishamandani*

Work is now underway on an innovative project to clean up Mirror Lake in Dover, Del., with SediMite, a product developed and tested by a team led by University of Maryland, Baltimore County (UMBC) researcher [Upal Ghosh, Ph.D.](#) An NIEHS Superfund Research Program (SRP) Individual Research grant provided funds to take the product, which uses activated carbon technology, from the lab into the field.

Delaware Governor Jack Markell, Dover Mayor Carleton Carey, members of the Delaware Department of Natural Resources and Environmental Control (DNREC), and others involved in the project were on hand Nov. 7 to view the progress of the lake restoration, which began Oct. 1.



*After SediMite was applied to Mirror Lake, a layer of sand was placed around a natural sand bar, to create a small wetland environment that will be planted in the spring to provide a new habitat for fish and wildlife. (Photo courtesy of Upal Ghosh)*

## Developing and applying the new remediation technology

[SediMite](#) uses activated carbon, the same technology employed in many water filters, to bind contaminants in sediment, reducing availability of harmful chemicals in the lake. The product's material is packaged with clay and sand into pellets that are convenient to handle and deliver. It slowly breaks up over time and mixes through natural processes when added to the water column.

“After we developed SediMite, we needed to test how the product would work,” said Ghosh. “That is where NIEHS stepped in, through an SRP grant that funded a [pilot-scale study](#) in 2007. The grant mechanism provided funds for innovative approaches to remediation of sediments, and it provided us with the funding to demonstrate our emerging *in-situ* sediment remediation technology in the field.”

The new project in Dover marks the largest application of SediMite since it was created by Ghosh in collaboration with Charlie Menzie, Ph.D., an expert in the field of risk assessment. The technology stemmed from earlier activated carbon material work by Ghosh and Richard Luthy, Ph.D., at Stanford University.

After they were able to demonstrate the effectiveness of their technology, Ghosh partnered with Menzie and founded a startup company, Sediment Solutions, which worked to scale-up the production of the pelletized product SediMite and make it available to users. Sediment Solutions has licensed two patents for the technology. The first is on the core binding technology of amending sediments, and the second on the technology of packaging sorbents into pellets.



*Ghosh deploys passive PCB samplers in Mirror Lake, to monitor the effectiveness of the remediation technology. (Photo courtesy of Upal Ghosh)*

## Restoring Mirror Lake

The project at Mirror Lake is the first full-scale implementation of the technology. DNREC came to Sediment Solutions looking for a way to reduce risk of exposure, from polychlorinated biphenyls (PCBs) in sediments in Mirror Lake, without causing major ecological damage to the lake as part of a restoration effort.

Mirror Lake and downstream areas have been in decline for several decades from stormwater runoff; contamination from chemicals, including PCBs and mercury; excess nutrients; bacteria; and invasive plant species. If left untouched, and with no further contamination, DNREC forecasts it would take several decades for the lake to clean itself naturally and for fish in the lake to be safe to eat. With the use of the SediMite technology, DNREC scientists anticipate a reduction of contaminants in fish tissue up to 90 percent within a few years.

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)

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## NIEHS trainee honored with Wetterhahn Award

*By Sara Mishamandani*

The NIEHS Superfund Research Program (SRP) has selected Corin Hammond, a doctoral student at the University of Arizona (UA), as the 16th recipient of the annual [Karen Wetterhahn Memorial Award](#). The award, which recognizes outstanding SRP graduates and postdoctoral researchers, was presented at the 2013 SRP Annual Meeting in Baton Rouge, La. The SRP acknowledged Hammond for her research contributions to stabilize metals in mining waste sites, and to reverse the damage in nearby soils.



Hammond is a graduate student under the guidance of Jon Chorover, Ph.D., in the Department of Soil, Water, and Environmental Science at the UA College of Agriculture and Life Sciences. She earned a B.S. in chemistry from Louisiana State University (LSU) and an M.A. in inorganic chemistry at UA.

“The science she is doing is not only cutting edge, but also addresses key SRP priorities, and is already impacting the field of environmental remediation science and how we evaluate remediation endpoints,” said Chorover. “Corin has emerged as a leader in our SRP graduate student research group and the UA environmental science graduate program as a whole.”

“Corin embodies the qualities that are the legacy of Dr. Wetterhahn,” added UA SRP Center Director Raina Maier, Ph.D. “In addition to aspiring to be an excellent student and scientist, she is called to help others become interested and successful in science.”

### Using plants to remediate mine waste

Hammond’s doctoral work combines field-scale experimentation in semiarid environments with bench-scale wet chemistry methods and molecular-scale spectroscopy techniques, to better understand how stabilizing contaminants, using plants, and phytostabilization affects the form and mobility of arsenic in mine waste. Also known as mine tailings, mine waste often contains toxic metals, which people can inhale through dust. At UA SRP, researchers have identified suitable native plants and conditions that allow them to grow where mine contamination is found. The plants stabilize the tailings, keeping them from spreading long distances through wind erosion.

Since 2010, Hammond has been collecting a series of samples from the UA SRP phytostabilization field trial at the Iron King Mine and Humboldt Smelter Superfund Site, to better understand the interactions between mine tailings, plant roots, and surrounding microbes. The site has high concentrations of arsenic and other metals, with the potential for off-site transport and exposure in the adjacent community of Dewey-Humboldt. Hammond’s work is suggesting that, contrary to expectation, plants keep arsenic from moving through the soil, by incorporating it into its stable growth phases.

Hammond is also passionate about giving back to the community. She has served as an Arizona Assurance Scholars Program graduate mentor since 2010, a program focused on providing encouragement and mentoring to low-income students. She has also volunteered for UA SRP research translation activities, particularly in the development of informational pamphlets on phytoremediation and household hazardous waste.

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)



*Hammond travelled to LSU, her alma mater and host of the SRP annual meeting, to accept the Wetterhahn Award and present her research. (Photo courtesy of Corin Hammond)*



*LSU SRP Training Core leader Robin McCarley, Ph.D., left, presented Hammond with her award at the meeting. (Photo courtesy of Kelli Palmer, LSU SRP)*

## Remembering Karen Wetterhahn

An expert in the mechanisms of metal toxicity, Wetterhahn was best known for her research on chromium. As a professor of chemistry at Dartmouth College, she founded Dartmouth's Toxic Metals Research Program in 1995.

In addition to research, Wetterhahn was passionate about teaching. Concerned about the higher dropout rate of women from the sciences as compared to men, she worked with a colleague to develop the Women in Science Project at Dartmouth. This successful program provides a learning environment where first-year women engage in experiences designed to further their interest in science, math, or engineering.

Tragically, Wetterhahn died in 1997, as a result of dimethylmercury poisoning, caused by the accidental spill of a few drops of the chemical on her latex glove-covered hand. Wetterhahn's death shocked the scientific community, including regulatory agencies, because she had taken all required safety measures known at the time. Safety guidelines by the Occupational Safety and Health Administration were soon changed to reflect the high risk associated with the use of dimethylmercury.

As a tribute to her legacy, NIEHS created the annual Karen Wetterhahn Memorial Award, shortly after her death. The award recognizes outstanding young scientists who are conducting research relevant to Superfund or the cleanup of hazardous waste sites. The awardee receives support to attend one major scientific conference, in addition to travel funds to attend the NIEHS SRP annual meeting, where they present their research.

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## NIEHS scientists present research at neuroscience meeting

*By Jacqueline de Marchena*

Research from NIEHS was showcased at the 43rd [annual meeting](#) of the Society for Neuroscience (SfN) Nov 9-13 in San Diego.

Researchers from the Institute joined more than 30,000 international scientists participating in a fast-paced schedule that included poster presentations, symposia, and special lectures. This large, yearly meeting fosters interdisciplinary discussion and encourages the development of treatments for neurological disorders.

Discovering the anatomical connectivity of cells within the nervous system was the focus of three SfN Presidential Special Lectures highlighting the importance of this area of research. The lectures described the use of computer-assisted image acquisition methods to create a connectome, or wiring diagram, of the brain.

“By uncovering the connectome of the nervous system, we can better understand neurological disorders that result from aberrant brain connections,” said Jeff Lichtman, M.D., Ph.D., Jeremy R. Knowles Professor of Molecular and Cellular Biology at Harvard University, during his SfN Presidential Special Lecture.





## Fostering discourse between neuroscientists

NIEHS Laboratory of Neurobiology lead researchers [Jerry Yakel Ph.D.](#), Serena Dudek Ph.D., David Armstrong Ph.D., and [Patricia Jensen Ph.D.](#), all had postdoctoral fellows presenting ongoing research projects.

“I gained insight from other researchers, while presenting my poster, and I was also able to attend a lot of talks and special lectures that gave a great overview,” said Fengxia Mizuno, Ph.D., research fellow in the Membrane Signaling Group, headed by [Armstrong](#).

“The [SfN] meeting provided wonderful opportunities for me to discuss my work with renowned scientists,” said Maile Henson, Ph.D., a postdoctoral fellow in the Synaptic and Developmental Plasticity Group, headed by [Dudek](#). “I also learned about cutting-edge research in neuroscience, and networked with my peers and future colleagues,” added Henson.

## An opportunity for professional development

The SfN annual meeting sponsors a myriad of career development lectures, workshops, and socials, to assist scientists at all career stages.

Scientists interested in pursuing a career in academic research can benefit from attending seminars on grant writing and publishing, while others can explore a variety of career options, including science writing, program management, and academic administration.

SfN also supports its members, between annual meetings, by offering a wealth of information about neuroscience-related jobs, conferences, and outreach opportunities on their website.

(Jacqueline de Marchena, Ph.D., is an Intramural Research Training Award fellow in the NIEHS Developmental Neurobiology Group.)

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# UC Berkeley meeting explores methods to detect more chemicals

*By Sara Mishamandani*

Understanding the bigger picture of human exposure through state-of-the-art analytical chemistry was the focus of the Sept. 20 NIEHS-funded University of California (UC), Berkeley Superfund Research Program (SRP) meeting in California. The gathering brought academic researchers together with interested stakeholders, to focus on the field of chemical analysis and its potential for identifying emerging contaminants and analyzing the totality of human exposure.

“We have a lot of targeted methods for determining contaminants, but these usually only pick up what we already know about. The fact that we are still finding emerging contaminants is proof that we don’t want to assume only known chemicals are important,” said Amy Kyle, Ph.D., UC Berkeley SRP Research Translation Core co-leader and meeting organizer. “This meeting emphasized the importance of untargeted methods that look across the environmental spectrum to see the whole picture.”

What Kyle described as the whole picture is also known as the exposome, which represents the totality of environmental exposures of an individual from conception forward. Evaluating the exposome is important, because the internal chemical environment reflects the combined effects of contaminants from air, water, and food, as well as chemicals produced in the body.

## Discussing new advances to investigate the exposome

UC Berkeley SRP Director Martyn Smith, Ph.D., kicked off the meeting and was followed by David Balshaw, Ph.D., program director in the NIEHS Center for Risk and Integrated Sciences, who presented a national overview of metabolomics and exposomics.



2013 Symposium: Emerging Science for Children's Environmental Health  
January 16-17

Cumulative Impacts and Children's Environmental Health

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**Linked video:**

Watch as Smith explains the "Exposome Paradigm" (25:47)

(Launches in new window)

In the keynote, David Sedlak, Ph.D., co-director of UC Berkeley Water Center, described a systems approach to understanding contaminated water, which requires an interdisciplinary approach involving chemists, health scientists, and engineers.

Panel discussions focused on new technology advances to detect contaminants, and explored ways to link technologies and institutions, to address emerging contaminants. In each panel, scientists with expertise in a specific technology or field had 15 minutes to explain their work. Presentations will be available online on the [UC Berkeley SRP website](#).

Presenters discussed state-of-the-art mass spectrometry and other techniques to explore the human exposome and metabolome. Topics focused on using untargeted techniques and measuring classes, as well as groupings of chemicals, rather than one specific chemical, in an environmental sample.

## Expanding partnerships at the UC Berkeley SRP

The meeting also offered opportunities for participants to learn more about the UC Berkeley SRP. The day began with a poster session, where students and postdoctoral scholars affiliated with the UC Berkeley SRP presented their current projects and recent results to meeting participants. A session for Superfund project updates provided participants with a concise summary of results and next steps for each UC Berkeley SRP project.



*Kyle leads the UC Berkeley SRP Research Translation Core, which works to translate research findings and scientific knowledge for government agencies, relevant business interests, and general audiences. (Photo courtesy of Amy Kyle)*



*"We think we are at the point where the technology has developed sufficiently so that we can start to see the whole picture with regard to human exposure to chemicals," said Smith in his opening talk. (Photo courtesy of Martyn Smith)*



*"There are multiple conceptualizations of the exposome and a need to develop a unifying conceptual framework," said Balshaw. Balshaw explained common elements of the exposome concept, current challenges to measure the human exposome, and ideas moving forward. (Photo courtesy of Steve McCaw)*



“Berkeley has one of the best chemistry programs in the world, and several experts in the field of analytical chemistry attended our meeting,” said Kyle. “Continuing to expand these partnerships at Berkeley SRP provides us with vast intellectual and technical resources to think about exposure science in different ways and see the larger picture moving forward.”

The UC Berkeley SRP focuses on using advanced technology, including omics and nanotechnology, to develop biological markers and apply them in human population studies, to improve chemical detection, and to facilitate and lower the cost of waste site remediation.

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)

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## This month in EHP

The November-December issue of [Environmental Health Perspectives \(EHP\)](#) spotlights urban gardening and the need for better water quality for fish.



<http://twitter.com/ehponline>

### Urban Gardening: Managing the Risks of Contaminated Soil

The urban decay of the middle and late twentieth century has given way to a gardening revival in cities around the globe. But, urban soils are often heavily contaminated with metals, polycyclic aromatic hydrocarbons, and other contaminants, prompting concerns about the health consequences of urban gardening, and offering new solutions.

### How Safe Is Safe? Fish Consumption Rates in the Pacific Northwest

Many Native Americans consume much more fish and shellfish than average, exposing them to high levels of toxic chemicals that bioaccumulate in aquatic life. Pressure from tribal governments, led by the Confederated Tribes of the Umatilla Indian Reservation, culminated in Oregon, enacting the nation’s most protective state water quality standards in 2011. Other tribes in the region, as well as the U.S. Environmental Protection Agency, would like to see the same measure repeated throughout the Pacific Northwest.



**Featured research and related news articles this month include:**

**Perfluorooctanoic Acid (PFOA) Exposures and Incident Cancers Among Adults Living Near a Chemical Plant** — PFOA and Cancer in a Highly Exposed Community: New Findings From the C8 Science Panel

**Air Pollution Exposure and Lung Function in Children: The ESCAPE Project** — Small Changes, Big Impact: Exposure to Air Pollution and Reduced Lung Function in Children

**Research on the Premotor Symptoms of Parkinson's Disease: Clinical and Etiological Implications** — Before the Tremor: Premotor Symptoms of Parkinson's Disease

**Insulin Resistance and Environmental Pollutants: Experimental Evidence and Future Perspectives** — Toxicity Testing From the Bottom Up: Proposed Protocol for Screening Pollutants Linked to Insulin Resistance

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## Lewis Cantley to give Rodbell lecture

*By Robin Arnette*


The 2013 Dr. Martin Rodbell Lecture Series Seminar will feature [Lewis Cantley, Ph.D.](#), the scientist who led the team that discovered the phosphoinositide 3-kinase (PI3K) pathway in 1985. Since then, subsequent research has determined that mutations in the PI3K pathway are commonly found in many human cancers.

NIEHS Deputy Director [Richard Woychik, Ph.D.](#), will host Cantley's talk, "PI3K and cancer metabolism," Dec. 10 at 11:00 a.m. in the NIEHS Rodbell Auditorium.



Cantley is the Margaret and Herman Sokol Professor in Oncology Research and Director of the Cancer Center at Weill Cornell Medical College and New York-Presbyterian Hospital. Cantley has been the recipient of numerous awards, including being elected to the National Academy of Sciences and to the American Academy of Arts and Sciences. In February 2013, Cantley won a \$3 million



*Cantley's research focus is to understand the biochemical pathways that regulate normal mammalian cell growth and the defects that cause cell transformation. He has authored nearly 400 peer-reviewed journal articles and 100 reviews and book chapters on the topic. (Photo courtesy of Lewis Cantley)*



**Linked video:**  
[Watch Cantley talk about his PI3K work with collaborator Pier Paolo Pandolfi, M.D., \(6:50\)](#)  
(Launches in new window)

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**Breakthrough Prize**, administered by the [Breakthrough Prize in Life Sciences Foundation](#), a not-for-profit corporation dedicated to advancing breakthrough research, celebrating scientists, and generating excitement about the pursuit of science as a career. It is the largest academic prize for medicine and biology, and recognizes excellence in research aimed at curing intractable diseases and extending human life.



Now in its 15th year, the Rodbell Lecture is one of two named talks in the annual NIEHS Distinguished Lecture Series. It honors former NIEHS Scientific Director and Nobel laureate [Martin Rodbell, Ph.D.](#), who presented the first talk in the series shortly before his death in 1998. Rodbell shared the 1994 Nobel Prize in Physiology or Medicine with [Alfred Gilman, M.D., Ph.D.](#), for the discovery of G-proteins, signal transducers that transmit and modulate signals in cells to control fundamental life processes.

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## Extramural papers of the month

*By Nancy Lamontagne*

- [Epigenetic effects of DDT lead to obesity in later generations](#)
- [Air pollution and psychological distress during pregnancy](#)
- [Eliminating damaged mitochondria from neuronal cells](#)
- [Maternal inhalation of nanomaterials can influence fetal health](#)

Read the current Superfund Research Program [Research Brief](#). New issues are published on the first Wednesday of each month.

## Epigenetic effects of DDT lead to obesity in later generations

A mouse study, supported in part by NIEHS, indicates that ancestral exposure to the insecticide dichlorodiphenyltrichloroethane (DDT) can promote obesity and associated disease in later generations. The findings imply that environmental exposures experienced several generations before might influence rates of obesity, although the degree of involvement is not known.

To examine potential transgenerational effects of DDT, the researchers transiently exposed pregnant female rats to DDT and then looked for obesity and obesity-related disease in the next three generations of offspring. The first generation offspring, which were directly exposed as fetuses, did not develop obesity, but did show kidney, prostate, ovary disease, and tumor development as adults. In the third generation or great-grand-offspring, more than 50 percent of males and females developed obesity. The transgenerational transmission of disease took place through both female (egg) and male (sperm) germlines. The researchers found differential DNA methylation regions, which are epigenetic changes in sperm, in the third generation. Genes associated with the identified differential DNA methylation regions were previously shown to be associated with obesity.

DDT was developed as a pesticide in the 1940s and was commonly used in the United States until banned in 1972. It is very persistent in the environment and still used to control malaria in other parts of the world. The researchers say that the long-term health and economic effects of DDT exposure on future generations should be considered in areas where DDT is used.

*Citation:* [Skinner MK, Manikkam M, Tracey R, Guerrero-Bosagna C, Haque M, Nilsson EE. 2013. Ancestral dichlorodiphenyltrichloroethane \(DDT\) exposure promotes epigenetic transgenerational inheritance of obesity. BMC Med 11:228.](#)

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# Air pollution and psychological distress during pregnancy

Research supported by NIEHS found that maternal psychological distress, combined with exposure to polycyclic aromatic hydrocarbon (PAH) air pollution during pregnancy, adversely affects children's behavioral development. The results point to the need for a multifaceted approach for preventing developmental problems in children.

The researchers followed 248 children of nonsmoking white women in the coal-burning region of Krakow, Poland, from before birth until age 9. They used personal air monitoring during pregnancy to determine prenatal PAH exposure, and used the Psychiatric Epidemiology Research Instrument-Demoralization to determine maternal demoralization, a measure of psychological distress. The Child Behavior Checklist was used to evaluate child behavior.

The researchers found that maternal demoralization was linked with behavioral problems in the children, including anxiety, depression, attention problems, rule-breaking, externalizing problems, and aggressive behavior. The effects of demoralization were greatest among children with higher levels of prenatal exposure to PAHs.

*Citation:* Perera FP, Wang S, Rauh V, Zhou H, Stigter L, Camann D, Jedrychowski W, Mroz E, Majewska R. 2013. Prenatal exposure to air pollution, maternal psychological distress, and child behavior. *Pediatrics* 132(5):e1284-1294.

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# Eliminating damaged mitochondria from neuronal cells

NIEHS-supported researchers have provided evidence that the externalization of the mitochondrial phospholipid cardiolipin signals for the elimination of damaged mitochondria in neuronal cells. Dysfunctional mitochondria generate reactive oxygen species and release mediators that kill cells. So, recognizing and breaking down unhealthy mitochondria by autophagy, a process of metabolically mediated cell degradation, is essential for cellular health.

Cardiolipin is found in the inner membrane of healthy mitochondria and is not present in any other organelle. Using primary cortical neurons and neuroblastoma cells, the researchers found that the insecticide, rotenone; substances that destroy the dopaminergic and noradrenergic neurons, staurosporine and 6-hydroxydopamine; and other proautophagy stimuli caused cardiolipin to move from the inner mitochondrial membrane to the mitochondrial surface. If the scientists inhibited cardiolipin synthase, or a protein that transports cardiolipin to the outer mitochondrial membrane, delivery of mitochondria to autophagosomes decreased.

The researchers also found that the autophagy protein microtubule-associated-protein-1 light chain 3 (LC3) contains cardiolipin-binding sites important for the engulfment of mitochondria. LC3 mediates both autophagosome formation and cargo recognition.

The findings from this study point to a mechanism by which externalized cardiolipin, in injured mitochondria, interacts with LC3, mediating targeted autophagy of mitochondria in primary neurons and transformed neuronal cells.



*Citation:* Chu CT, Ji J, Dagda RK, Jiang JF, Tyurina YY, Kapralov AA, Tyurin VA, Yanamala N, Shrivastava IH, Mohammadyani D, Qiang Wang KZ, Zhu J, Klein-Seetharaman J, Balasubramanian K, Amoscato AA, Borisenko G, Huang Z, Gusdon AM, Cheikhi A, Steer EK, Wang R, Baty C, Watkins S, Bahar I, Bayır H, Kagan VE. 2013. Cardiolipin externalization to the outer mitochondrial membrane acts as an elimination signal for mitophagy in neuronal cells. *Nat Cell Biol* (10):1197-1205.

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## Maternal inhalation of nanomaterials can influence fetal health

NIEHS grantees report evidence that maternal inhalation of engineered nanomaterials can have fetal and maternal microvascular effects in an animal model. Microcirculation is important for fetal health, because it regulates blood flow distribution and protects downstream tissues from high arterial pressures and blood flow rates.

The researchers designed a study to evaluate the microvascular effects of maternal exposure to nanomaterials, and to find out if the Barker hypothesis applies at the microvascular level. The Barker hypothesis proposes that fetal development, within a hostile gestational environment, may predispose or program future sensitivity. The researchers placed pregnant rats in an inhalation chamber, where they were exposed to nanotitanium dioxide aerosols for five hours per day, for an average of 8.2 days.

Exposure to the engineered nanomaterials led to significant maternal and fetal microvascular dysfunction. Fetal microvessels, isolated from exposed dams, demonstrated significant impairments to signals of vasodilation specific to mechanistic signaling and shear stress. The maternal uterine microvascular reactivity was also affected. The researchers conclude that maternal inhalation of engineered nanomaterials can influence fetal health and that the Barker hypothesis does apply at the microvascular level.

*Citation:* Stapleton PA, Minarchick VC, Yi J, Engels K, McBride CR, Nurkiewicz TR. 2013. Maternal engineered nanomaterial exposure and fetal microvascular function: does the Barker hypothesis apply? *Am J Obstet Gynecol* 209(3):227.e1-e11.

(Nancy Lamontagne is a science writer with MDB Inc., a contractor for the NIEHS Division of Extramural Research and Training.)

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## Intramural papers of the month

*By Jacqueline de Marchena, Monica Frazier, Raj Gosavi, and Bailey Schug*

- [Understanding how ribonucleotides in DNA exert their biological effects](#)
- [Stress hormone signaling found to prevent heart disease](#)
- [DNA methylation as a biomarker to detect breast cancer](#)
- [Tanning gene linked to increased risk of testicular cancer](#)

# Understanding how ribonucleotides in DNA exert their biological effects

NIEHS scientists recently showed that a surprisingly large number of ribonucleotides are incorporated into the genome during nuclear DNA replication. They have now shown that if these ribonucleotides are not removed from the genome, they cause replicative DNA polymerases to stall during subsequent rounds of replication. This stalling increases as the number of consecutive ribonucleotides present in the DNA template increases from one to four.

Structural studies using X-ray crystallography reveal that the presence of ribonucleotides in the DNA template is associated with changes in the conformation of both the DNA and the replicative polymerase, and that the extent of these changes correlates with the amount of stalling. This work enhances our understanding of the biological consequences of ribonucleotides in DNA. Their effects may actually be beneficial in some circumstances, but, in other circumstances, they may result in replication stress and genome instability. These latter, negative effects may be relevant to diseases associated with defects in the processes that remove ribonucleotides from the genome, including a rare neuroinflammatory condition, Aicardi-Goutières syndrome. **(RG)**

*Citation:* Clausen AR, Murray MS, Passer AR, Pedersen LC, Kunkel TA. 2013. Structure-function analysis of ribonucleotide bypass by B family DNA replicases. *Proc Natl Acad Sci U S A* 110(42):16802-16807.

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## Stress hormone signaling found to prevent heart disease

Recently reported in PNAS, NIEHS researchers and their collaborators discovered that glucocorticoid receptor (GR) signaling in cardiomyocytes is necessary for normal heart function, and may provide a therapeutic approach for treating cardiovascular disease.

Chronic stress is increasingly recognized for its contribution to the development and progression of heart disease, a leading cause of death in the Western world. Glucocorticoids are hormones that mediate the stress response by binding the GR and regulating gene expression. To determine the role of stress hormone signaling in heart muscle cells, the researchers generated knockout mice lacking GR specifically in cardiomyocytes.

They found that these mice die early from spontaneous cardiovascular disease. By three months of age, the mice exhibited cardiac hypertrophy and a decrease in left ventricular systolic function. Hearts became severely dilated by six months of age, resulting in premature death. Global gene expression analysis of GR-deficient hearts revealed a decrease in the expression of genes that play an important role in maintaining cardiac contractility, repressing cardiac hypertrophy, promoting cardiac survival, and inhibiting inflammation. Therefore, while sustained increases in glucocorticoids have been associated with adverse effects on the heart, these results suggest that the normal pulsatile secretion of these hormones is critical for maintaining cardiovascular function. **(JDM)**

*Citation:* Oakley RH, Ren R, Cruz-Topete D, Bird GS, Myers PH, Boyle MC, Schneider MD, Willis MS, Cidlowski JA. 2013. Essential role of stress hormone signaling in cardiomyocytes for the prevention of heart disease. *Proc Natl Acad Sci U S A* 110(42):17035-17040.

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# DNA methylation as a biomarker to detect breast cancer

Sister Study researchers at NIEHS have shown that the overall level of DNA methylation across the genome is associated with future risk of developing cancer. DNA methylation is a form of epigenetic modification associated with gene expression.

The Sister Study is designed to explore genetic and environmental determinants of breast cancer. The NIEHS team measured methylation at LINE-1 elements in blood DNA samples collected from some women who later developed breast cancer, and compared their methylation levels to women in the study who remained cancer-free. They found that women with low levels of blood DNA methylation had a 1.75-fold increased risk of developing breast cancer compared to women with high levels of methylation, and that these differences were detectable months to years before the clinical diagnosis of breast cancer.

DNA methylation changes in response to environmental exposures, such as chemical pollutants, diet, and other lifestyle factors, which in turn may be associated with an increased risk of cancer. This study adds to the growing body of literature linking changes in blood DNA methylation to future risk of developing cancer, and may help researchers move closer to developing blood tests that can predict a woman's chance of getting cancer, as well as lifestyle strategies for lowering risk. **(BS)**

*Citation:* [DeRoo LA](#), [Bolick SC](#), [Xu Z](#), [Umbach DM](#), [Shore D](#), [Weinberg CR](#), [Sandler DP](#), [Taylor JA](#). 2013. Global DNA methylation and one-carbon metabolism gene polymorphisms and the risk of breast cancer in the Sister Study. *Carcinogenesis*; doi:10.1093/carcin/bgt342 [Online 15 October 2013].

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# Tanning gene linked to increased risk of testicular cancer

Collaborative efforts between NIEHS and the University of Oxford have found that a variant in a gene that promotes skin tanning is associated with an increased risk of testicular cancer. This variant, also known as a single-nucleotide polymorphism (SNP), is located in the KITLG gene, a gene that is controlled by the tumor suppressor p53, the most commonly mutated gene in human cancers.

The group combined searches of comprehensive data sets of genetic variation associated with cancer risk with laboratory experiments, and identified a single SNP that affects p53 binding to a control element in the KITLG gene. The SNP confers protection to the skin against sun damage, by increasing production of pigmented cells called melanocytes. The authors suggest that during human evolution, this SNP has become more common in populations with light skin for this beneficial reason.

However, in testicular cells, the situation appears reversed. The researchers hypothesize that increased cell division driven by the KITLG SNP may permit the growth of tumor cells, increasing cancer risk for those that carry the gene variant. Interestingly, for this type of tumor growth to occur, the p53 gene must remain fully functional, which is very unusual in cancers, and this may explain why testicular cancers have a very high cure rate. **(MF)**

*Citation:* [Zeron-Medina J](#), [Wang X](#), [Repapi E](#), [Campbell MR](#), [Su D](#), [Castro-Giner F](#), [Davies B](#), [Peterse EF](#), [Sacilotto N](#), [Walker GJ](#), [Terzian T](#), [Tomlinson IP](#), [Box NF](#), [Meinshausen N](#), [De Val S](#), [Bell DA](#), [Bond GL](#). 2013. A polymorphic p53 response element in KIT ligand influences cancer risk and has undergone natural selection. *Cell* 155(2):410-422. [Story](#)



(Jacqueline de Marchena, Ph.D., is an Intramural Research Training Award [IRTA] fellow in the NIEHS Developmental Neurobiology Group. Monica Frazier, Ph.D., is an IRTA fellow in the NIEHS Mechanisms of Mutation Group. Raj Gosavi, Ph.D., is a research fellow in the NIEHS Structure and Function Research Group. Bailey Schug studies health promotion and nutrition at Appalachian State University and is an intern in the NIEHS Office of Communications and Public Liaison.)

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# Inside the Institute

## Future NIH administrative leaders visit NIEHS

*By Amy Stull*

A group of future NIH administrative, science management, and policy leaders spent Sept. 20 on the NIEHS campus in Research Triangle Park, N.C.

Fourteen Presidential Management Fellows (PMFs) and NIH Management Interns (MIs) traveled from the Washington D.C. area to NIEHS to learn about the Institute and its programs. During the visit, the interns and fellows also had the opportunity to meet a variety of staff and begin conversations about potential intern rotations at NIEHS. The visitors were joined by an MI and a PMF now completing rotations at NIEHS, as well as a PMF who has been assigned to NIEHS for the entirety of her program.

NIH has participated in the government-wide Presidential Management Fellows Program since 1985. PMFs develop rotational assignments across the various NIH institutes and centers (ICs), in a broad range of administrative and programmatic research support areas, including budget and finance, outreach and communications, information technology, grants management, program and management analysis, contracts management, human resources, and general administration. These rotational opportunities provide on-the-job training with exposure to senior leadership.

The NIH Management Intern program was established in 1957 and has trained more than 400. The program offers the opportunity for highly motivated employees to explore different administrative fields, gain invaluable insight into science management, and change careers within NIH.

### Experiencing life at NIEHS

During their visit, the PMFs and MIs were given an overview of environmental health, NIEHS history, and current strategic planning efforts by Kimberly Thigpen Tart, J.D., and Sheila Newton, Ph.D. The visitors then departed on a walking tour of the Institute led by John Schelp of the Office of Science Education and Diversity.

Next, the group had the opportunity to visit the First Environments Early Learning Center, where they were greeted by Executive Director Beth Lake and shown the sustainable operations of the childcare center, including the edible garden and outdoor play spaces filled with reclaimed materials.

### Positive Outcomes

In an email following the visit, first year PMF David Robinson expressed his appreciation for the opportunity to visit, saying, “It was very rewarding and valuable, and it gave me a great insight into what your institute does and the important mission you are charged with.” Second year PMF Laura Damiano expressed similar sentiments. “I truly enjoyed seeing the NIEHS campus and learning more about the great work the institute supports,” she wrote.

Austin, who started her federal career as a Presidential Management Fellow, sponsored the trip. She remembers her opportunity to visit NIEHS during her fellowship, and the benefit of learning about the unique mission of NIEHS and how it functions as part of NIH, even though it is located in North Carolina. She believes it is valuable to pass that experience on to the current interns and fellows, in hopes of creating future ambassadors, and maybe recruiting future employees for NIEHS.

The visitors then returned to the Rodbell Auditorium to hear from former PMFs and MIs who are now working at NIEHS, including Liam O’Fallon, Jim Remington, Barbara Gittleman, and Molly Puente, Ph.D., from the Division of Extramural Research and Training, as well as Chris Long from the Office of Management. The panel shared stories about their varied career trajectories and articulated different reasons why they are happy to have found a home at NIEHS.

After lunch and networking with the panelists, the group spent some time talking with Joellen Austin about her role as the Executive Officer and Associate Director for Management, and the opportunities and challenges of leading at NIEHS compared to other NIH ICs.

The day concluded with presentations by senior staff members highlighting a few of the Institute’s unique programs, including the National Toxicology Program by Mary Wolfe, Ph.D.; the Clinical Research Unit by Stavros Garantziotis, M.D.; the NIEHS journal Environmental Health Perspectives by Jane Schroeder, D.V.M., Ph.D.; the Sister Study by Dale Sandler, Ph.D.; the Superfund Research Program by Beth Anderson; and the Partnerships for Environmental Public Health by Liam O’Fallon.

(Amy Stull is an NIH Management Intern who recently completed a rotation, from September through November, as a Management Analyst in the NIEHS Office of Management.)



*Interns joined their mentors on the NIEHS Building 101 patio. (Photo courtesy of Steve McCaw)*

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# Federal employees meet at NIEHS to elevate their careers

*By Ian Thomas*

Dozens of attendees gathered Nov. 21 at NIEHS for the first-ever Elevate Your Career event, a new program designed to further employees' understanding of the federal job search and promotions processes, while also providing them a casual setting in which to network and explore career ideas with colleagues, mentors, and peers.

"Even those of us who've been in government for years still have questions about career development," said Kim Kirkpatrick, disability program manager in the NIH Office of Equal Opportunity and Diversity Management, who sponsored the program along with the NIEHS Diversity Council and the NIH Office of Human Resources. "The goal of this event was really to create a relaxed environment, so that our attendees could learn more about the options available to them in their current jobs, and also discover new careers, by speaking with those already in them."

Held in honor of [National Hispanic Heritage Month](#) and [National Disability Employment Awareness Month](#), the event welcomed participants from several government organizations including NIEHS, NIH, and the U.S. Environmental Protection Agency (EPA).



*Kirkpatrick explains the rules of Flash Networking. (Photo courtesy of Steve McCaw)*

## Careers in a flash

The Elevate Your Career schedule was comprised of two major components, the first of which was Flash Networking. Conducted in a similar manner as speed dating, Flash Networking sought to pair attendees with volunteer mentors from a wide range of career paths for a 10-minute sprint of questions about each mentor's background and field. At the conclusion of each session, participants shifted to a different mentor and career path to restart the process.

"Learning how to be positive and surround yourself with quality mentors can really go a long way in furthering your career," said Melissa Gentry, a supervisory contract specialist with the NIEHS Office of Acquisitions and a volunteer mentor for the day. "That's why events like these are great, because they allow you to network with a lot of different people from a lot of different areas, and you never know where those connections could one day lead."

"Right now, I'm working on the bench and, while I like it, I'm not sure that's what I want to do for my entire career," added Deacquinta Diggs, Ph.D., a postdoctoral biologist at EPA with a budding interest in science writing. "I came here looking for some fresh ideas on things I could do differently someday down the line."



*Roman fields a question on diversity in the workplace. (Photo courtesy of Steve McCaw)*

After Flash Networking, participants then shifted to Landing Jobs and Promotions, an interactive workshop from the NIH Office of Human Resources designed to give attendees a better understanding of the vacancy announcement, questionnaire, and classification processes, along with tips on resume formatting, cover letter writing, and interview preparation.

The workshop also provided information on a number of government initiatives designed to foster the hiring of persons with disabilities, such as [Schedule A](#) and the [Workforce Recruitment Program](#).

### Learning on the job

“These kinds of interactive activities are of unlimited benefit to the individual and the organization,” said NIH Hispanic Employment Program Manager Gerard Roman, who partnered with Kirkpatrick and others to coordinate the event. “We often see each other in the hallways, elevators, and cafeteria, sometimes taking for granted the opportunities that we have to learn from each other. Programs like Elevate Your Career are built to change that and, by doing so, allow us all to reap the rewards of those experiences.”



*NIEHS Administrative Officer Charletta Fowler caught the spirit of Flash Networking, as she engaged with others during the exercise. (Photo courtesy of Steve McCaw)*



*Melissa Gentry, left, and Brad Collins, right, join dozens of their peers for a session of Flash Networking. (Photo courtesy of Steve McCaw)*



*Tina Jones, left, and Annette Rice, right, discussed the value of contact networking. (Photo courtesy of Steve McCaw)*

(Ian Thomas is a public affairs specialist with the NIEHS Office of Communications and Public Liaison, and a regular contributor to the Environmental Factor.)

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# America Recycles Day returns to NIEHS

By Mallikarjuna Metukuri

NIEHS celebrated its second annual [America Recycles Day \(ARD\)](#) Nov. 14, collecting shoes, items for pets, eyeglasses, and cell phones donated by Institute employees.

The program at NIEHS is coordinated by Sustainability Analyst Trisha Castranio, Hazardous Waste Manager Paul Johnson, and Environmental Compliance Officer Bill Steinmetz, who are involved in the highly successful NIEHS [environmental stewardship program](#). ARD allows employees to extend to their personal lives the same environmentally responsible practices they perform at work.

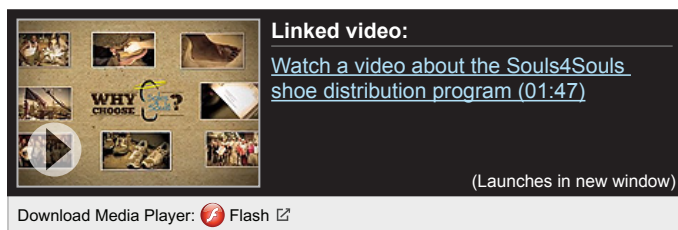
“America Recycles Day is a great opportunity for employees to clean out their closets, drawers, and attics,” said Castranio, “and to help the environment and reach out to people in need at the same time.”

Sponsored by private and public entities and the U.S. Environmental Protection Agency, ARD was established in 2009 by the national nonprofit Keep America Beautiful. ARD is the only nationally recognized event dedicated to encouraging Americans to recycle and to buy recycled products.

## Highlighting the benefits of recycling and helping the economy

According to Castranio, ARD at NIEHS empowers employees to help reduce toxins going into the environment and extend the lives of products that could be reused by others. The event also raises awareness of the importance of working toward environmental sustainability at home, as well as at work.

This year, ARD collected and distributed blankets, towels, leashes, bowls, beds, and toys to animal rescue efforts, and used eyeglasses to [OneSight](#) who distributes them to those in need. Cellphones were donated to [Cellphones for Soldiers](#), new and lightly worn shoes to [Soles4Souls](#), and old sneakers to the Converse [ReUSE A SHOE](#) program.



From left, NIEHS environmental stewardship staff Johnson, Steinmetz, and Castranio, who leads the ARD initiative, showed off the results of their collection efforts. (Photo courtesy of Steve McCaw)

## ARD — one piece of a vigorous environmental stewardship initiative

Honored as a Green Champion in 2010 for its environmental stewardship, NIEHS oversees a comprehensive program as part of its Health and Safety Branch that recycles laboratory and office waste, construction demolition material, and cafeteria waste. Each year, the amount of material saved from the landfill continues to grow, with a 32 percent increase from 2011 to 2012 when NIEHS recycled an impressive 653 tons of paper, wood, plastics, glass, cooking oil, and electronics.



The Institute also supports an aggressive water and electricity conservation program, as well as an alternative transportation effort ([see 2011 Sustainability Report](#)).

## America Recycles Day highlights the benefits of recycling

According to organizers of the national ARD, recycling helps to conserve natural resources and reduce greenhouse gas emissions that contribute to global warming. EPA estimates that recycling one ton of aluminum cans saves the energy equivalent of 36 barrels of oil or 1,655 gallons of gasoline.

Recycling also reduces costs to businesses and creates jobs. The American recycling and reuse industry is a \$200 billion dollar enterprise that includes more than 50,000 recycling and reuse establishments, employs more than one million people, and generates an annual payroll of approximately \$37 billion.

In 2007, the amount of energy saved from recycling aluminum and steel cans, plastic PET and glass containers, newsprint, and corrugated packaging was equivalent to:

- The amount of electricity consumed by 17.8 million Americans in one year.
- 29 percent of nuclear electricity generation in the U.S. in one year.
- 7.9 percent of U.S. electricity generation from fossil fuels in one year.
- 11 percent of the energy produced by coal-fired power plants in the U.S.
- The energy supplied from 2.7 percent of imported barrels of crude oil into the U.S.
- The amount of gasoline used in almost 11 million passenger automobiles in one year.

(Mallikarjuna Metukuri, Ph.D., is a research fellow in the NIEHS Laboratory of Signal Transduction.)

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## Sloane honored by local commuter awareness group

*By Ian Thomas*

Longtime NIEHS employee Richard “Dick” Sloane was honored Nov. 14 with the prestigious Lifetime Achievement Award as part of the [Golden Modes](#) — an annual awards event conducted by the local nonprofit [GoTriangle](#) to recognize extraordinary commuters and organizations that use and promote sustainable transportation throughout North Carolina’s Triangle region.

“I am both honored and humbled to be recognized by my peers in this way,” said Sloane, employee services program specialist with the NIEHS Office of Management and an avid cyclist. “More than anything, though, I’m happy to help bring more exposure to the kinds of mass and green transit alternatives that exist right here in our area.”



A native of Rochester, N.Y., Sloane moved to Durham in 1978, to become a biological lab technician with NIEHS. Since then, he has gone on to serve as a biologist, a technical information specialist, and a resource recovery specialist, before arriving at his current post as an employee services program specialist.

Still, as Sloane prepares for retirement in January, co-workers and colleagues agree that it's for his work with commuter awareness and recycling, inside and outside the institute, that Sloane will best be remembered.

“Dick works tirelessly around the Institute to promote things like recycling, alternative transportation, and our telework program,” said Ellen Moul, head of the NIEHS Administrative Services and Analysis Branch, and a longtime colleague of Sloane. “His enthusiasm for sustainability is contagious, and his efforts have made NIEHS a role model in that regard throughout the Triangle community.”

“Having lived in the Triangle for 35 years now, I’ve seen the growth in this area, like everyone else,” said Sloane, who plans to stay on with GoTriangle as a Triangle Transit ambassador and cycling mentor, while also serving in similar roles with the Research Triangle Foundation and Waste Reduction Partners. “In that time, however, I’ve also seen a steady rise in single-occupancy vehicle usage, and I look forward to having more time to let people know of the other options available to them for getting around — options that are better for their health, as well as that of our environment.”

GoTriangle is a partnership of public transportation agencies and organizations funded to promote commuter benefits in the Triangle. The GoTriangle.org website helps people easily find all the information they need to get out from behind the steering wheel and find other travel options that are safe, convenient, inexpensive, and more sustainable.

(Ian Thomas is a public affairs specialist with the NIEHS Office of Communications and Public Liaison, and a regular contributor to the Environmental Factor.)

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*Shown at the Golden Modes are, from left, Triangle Transit Sustainable Travel Services Supervisor Shelly Parker, emcee at the event; Sloane; and fellow winner and Triangle Transit Employer Outreach Coordinator Stephanie Loyka. (Photo courtesy of GoTriangle)*

## Proud ELF owner embraces alternative transport

*By Richard Sloane*

Rick Fannin turns quite a few heads as he zips through the streets of North Carolina’s Orange and Durham counties in his colorful locally manufactured ELF velomobile ([see text box](#)). What he’s been driving since late October looks like a cross between a bicycle and a car, complete with solar panels, an electric assist, and a futuristic shape.

Fannin, a research biologist in the NIEHS Microarray Group, ordered his new ELF last summer and started driving it to work last month. For fuel, he uses a combination of his own leg power and the vehicle's electric assist to make his 21-mile one-way trip to work from his home south of Chapel Hill. The fully charged battery lasts him the entire trip. As a backup, he has an extra lithium ion battery pack on board.

While not everyone can fit a bicycle into their daily lives for reasons of time, distance, safety, or weather, Fannin has found that velomobiles, like his ELF, lower the barrier to green transportation.

### **Self-reliant transportation that's safer than a bicycle**

Fannin said he first saw the ELF on the cover of the local Independent Weekly. He was fascinated by the concept of a covered, combination self-propelled and electric-propelled vehicle that had storage room and would be very inexpensive to operate. Following a test ride in early July, he ordered one just in time to avoid a scheduled price increase of \$1,000.

Fannin brings the battery pack into the office to charge on cloudy days, but leaves it in the parked velomobile on sunny days to let the solar panel recharge the battery. He uses the motor a good bit in the morning, to avoid getting too sweaty from pedaling. On the way home, he pedals more for the exercise. He has already lost a couple of pounds in the first few weeks of ownership.

The mirrors, lights, turn signals, and physical protection, from all but the worst natural elements, make it much safer than a bicycle. Fannin has driven his velomobile to work when the temperature was in the mid-30s. He said he warms up quickly when he's peddling, plus the windshield protects him from the icy air blast. He tries to travel shouldered roads, which gives motorists ample room to pass. He said most drivers seem to respect his rights on the road.

### **Trade-offs — time, exercise, and innovation**

Fannin's ride takes a little more than an hour, while driving his car takes about 30 minutes. Now, though, he doesn't need to spend an hour or more each day working out, so the time trade-off is about equal.

Although Fannin realizes he is probably pushing the envelope, physically, with the long commute, some through nonurban areas, he's committed to building his endurance. "One of the reasons I got the ELF was for an opportunity to exercise more regularly," Fannin said.



*Fannin is proud of his eye-catching new machine. The mirrors, lights, and turn signals on the ELF, along with physical protection from all but the worst natural elements, make it much safer than a bicycle. (Photo courtesy of Richard Sloane)*



*According to Fannin, the ride is very much like a bicycle. The big difference is the assistance of a small electric motor for getting up hills and maintaining a good speed — approximately 20 mph — with the velomobile, which weighs about 115 lbs. The vehicle is fun to drive and comfortable in the recumbent seat, but, without shocks or springs, it doesn't always offer a smooth ride. (Photo courtesy of Richard Sloane)*



The proud ELF owner offers one caveat — “Keep the battery dry.” He bought two, and one has stopped charging because it got wet. He said he hopes that once it dries completely, it will be all right. Recognizing this weakness in design, the manufacturer recommends that the battery, which comes wrapped tightly in plastic, also be protected with something like duct tape.

His velomobile does not require insurance. Maintenance costs are for simple chain cleaning, general lubrication, and adjustments that any bike shop can do. Tires, wheels, and components also are conventional and available at any bike shop.

(Richard Sloane is an employee services specialist with the NIEHS Office of Management.)



*The driver compartment keeps Fannin in touch with the road, but more protected from it and the weather outside than he would be on a bicycle. (Photo courtesy of Richard Sloane)*

## ELF — a local version of the European velomobile

Velomobiles are relatively new in the U.S., although they have been in common use for years in the Netherlands, Denmark, England, and Germany. They offer green transportation in an aerodynamic protective shell, and are often based on a recumbent car-like seating configuration, which maximizes comfort and efficiency. World human-powered speed records are all set in velomobiles.

Vehicles like the ELF offer electric assistance, greatly expanded luggage capacity, and bright LED lighting for safety and visibility. Most are based on a tricycle configuration, although some are bicycles (see <http://en.wikipedia.org/wiki/Velomobile> for more details). ELF is made in Durham, N.C.

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